SCIENCE AND INDUSTRY

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Contractors and Engineers Monthly

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PICKS and SHOVELS

By O. E. POTTER

The Pan-American Highway—Is It a Dream?

From Alaska to the Argentine is a far cry, and the idea of a good road the length of North, Central and South America seemed at one time an idle dream. Then gradually it began to materialize, to shape itself into a smooth, well-constructed highway, making motor transportation possible through sections of our hemisphere where there had been no means of transportation before.

A special Commission was appointed for a study of the construction of a highway to connect the northwestern part of the United States with British Columbia, Yukon Territory and Alaska, which Commission reported favorably on such a project.

The road would connect with several routes running north and south through the western section of the United States, leading to the Mexican border. But the emphasis in the past few years has been placed on the construction of the Inter-American Highway, from the Rio Grande through Mexico, Guatemala, Honduras, El Salvador, Nicaragua and Costa Rica to Panama.

Action and Inaction

Mexico has attacked the problem of the construction of its share of this great highway with a religious zeal and in November of this year a section of the road, from Nuevo Laredo on the U.S.-Mexico border to Mexico City, will be formally opened, with fanfare and brass bands and flags waving, and a special motor cavalcade from Washington, D. C., to participate in the festivities. But the 760 miles from the border to the capitol of Mexico is but a small portion of the 3,250 miles from the United States to Panama.

From Panama City comes the report

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Dustless Highways with Gumbo Base, Bituminous Surface

Low Cost Surface Handled Heavy Traffic of 3,000 Vehicles Daily

By CHAS. L. WILSON,
Oklahoma State Highway Engineer

IN any highway system there are certain sections which carry considerable traffic and which must be kept dustless for safety's sake and yet do not warrant expensive surfacing. Due to the importance of the road, however, it must be well maintained. A specific example of this type of road is State Highway 19 between Ada and Atoka, Okla., and State Highway 48 south from Ada to Pontotoc County and through a newly discovered oil field.

These roads had been previously graded and drained and treated with maintenance gravel surfacing, approximately 2 inches thick. Because of the amount and kind of traffic, the wear on this surface was very rapid and it was apparent that frequent applications of gravel would be necessary to properly maintain the highways. With the added need that the roads be dustless, it was decided to surface the roads with liquid asphalt mats.

Gumbo Base and Gravel Top

The grade on State Highway 48 was constructed of a heavy black gumbo soil and within itself provided a fair base. Gravel was hauled and distributed along this section, a distance of 9.2 miles, at the rate of 400 cubic yards per mile. The usual measurements and screen analyses were made every 200 feet along the road to determine the approximate amount of oil needed. The surface of

(Continued on page 25)

Moran Plans Details to Help Green Crew on 3.9-Mile NRH Job

(Photos on page 36)

Work on Concrete Job in Cass County, Nebr., Runs Smoothly Due to Good Management

FRANK J. MORAN has a genius for making the job easier for the men who are working for him. Ask any one of them and the reply comes back, "I like working for Moran. He treats you white and you get what you need to work with."

One of the larger jobs of the Moran Construction Co. last spring was the grading and paving of 3.9 miles on Nebraska Highway 24 between Union and Lincoln, NRH 256-B-Div. 1, in Cass County. His key men have become attached to the comfortable wagon camps that he has built up and maintains for them on every job. They are mounted on trailers and on this job were scattered all over the place. A half dozen were close to the office wagon in Elmwood, Nebr., but they could be seen in the yards of farm houses along the right-of-way and the pump foreman had his not 50 feet from the pumps so that he did not have to wander far from home to attend to his work day or night. There were twelve of these wagons on this job.

Putting the Grade in Shape

Six Mack BC 6-cylinder trucks with Differential Steel Car Co. three-way dump bodies of 5-yards capacity worked with the Adams No. 11 elevating grader with Buda power for the belt and pulled by an Allis-Chalmers Model L crawler tractor. An Adams No. 12 grader with a Caterpillar Sixty and an Allis-Chalmers power-controlled grader with another Sixty worked on the rough grade, spreading the fills and cleaning up all along the line. The fills were spread and then rolled in 6-inch lifts with a McCormick-Deering tractor roller weighing 7 tons. Where culverts were called for in the plans the contractor installed Republic Steel Co. U-Loy corrugated metal culvert pipe.

Setting Up Fine Grade and Forms

A 5-foot Euclid Tumble Bug pulled by a Caterpillar Twenty was used on the grade ahead of the forms to take out high spots and fill in low ones. Then a Ted Carr Formgrader slowly and patiently followed the string to cut the form trench accurately for the 9-inch Blaw-Knox steel forms for the 20-foot road. The last work before the forms were actually set was the smoothing up of the grade with an Adams 8-foot grader.

Three men handled the setting of the forms on either side and a crew of about twelve men did the hand work necessary between the forms. A Hug subgrader pulled on the forms by a Caterpillar Sixty cut the thickened slab trench 3 feet wide on either side against the forms, giving a uniform 7-inch thickness of slab for the 14 feet in the center and thickening to 9 inches at the forms. A Wehr one-man grader worked the grade between the forms and a McCormick-Deering roller ironed out the grade to smoothness.

The Batching Plant—Bulk Cement

The batching plant was located on a spur track in the town of Elmwood directly opposite the contractor's office. This made a 1.8-mile dead haul to the west or near end of the 3.9-mile job. A Link-Belt crane unloaded the sand and limestone coarse aggregate from the gondola cars to the Blaw-Knox batcher plant. On top of the bins a man spent part of his time removing pieces of old freight car flooring and rags from the aggregates. The foreman of the plant had his hands full, acting as traffic cop for the green truck drivers, each one of whom wanted to be as close to the batcher plant as he could get, which thus cut off the exit of the truck just loaded.

The batches consisted of 1,609 pounds of sand, 1,901 pounds of gravel, both dry weights, and 672 pounds of cement. The batches were designed for one sack of cement to 495 pounds of aggregate. As soon as they were loaded the batch trucks drove about 600 feet across the street and around a large storage shed to the bulk cement

(Continued on page 15)

HOW DIRT FLIES AT GRAND COULEE

The Stacker at the End of a Mile of Conveyors Capable of Moving 4,000 Tons of Dirt Per Hour. See Page 5.

Moving 225,000 Yards of Dirt a Month on 15-Mile Levee

(Phptos on page 36)

Electric Tower Machines Used by H. B. Blanks of Ferriday, La.

TO the grading contractor whose idea of a big job is 100,000 cubic yards of excavation, a 2,970,000-yard dirt moving contract is an eye-opener. Between July 24, 1934 and April 1, 1935, H. B. Blanks of Ferriday, La., moved this amount of dirt on a 15-mile new levee and enlargement contract.

The two Bucyrus-Erie tower machines used by the contractor were practically identical, one operating between Ferriday and Vidalia, La., and the other from Vidalia south to the end of the contract. This article will be devoted entirely to the latter machine, with the exception of the description of the night work which was noted at the first machine.

The Tower Machine

The huge head tower of structural steel and steel plates weighs about 300 tons and the tower is 137 feet high, carrying a 1½-inch diameter steel track cable which had a span of about 475 feet to the tail tower. The tower is

C. & E. M. Photo
The 15-Yard Bucket Starting Its Trip Toward the Levee

mounted on crawlers but because of the great weight of the machine it was sometimes necessary to provide a corduroy road for the crawlers.

Power for the electrical operation of the head tower was furnished by the Louisiana Power & Light Co. at 4,000 volts alternating current which was converted to the same voltage of direct current by a 600-hp motor generator set. Three 400-hp General Electric direct-current motors operating at 4,000 volts provide the power for the operation of the head tower.

For the lights within the machine and for the floodlights the current is converted to 120 volts. Four General Electric floodlights, two of 1,000 watts and two of 500 watts, and a Curtis 1,000-watt floodlight, provided illumination of the pit at night. For use in case of failure of the electric power, a 90-hp Wisconsin motor of four cylinders is provided for tracking the head tower and a similar machine is used constantly in the tail tower for moving it as required. The tail tower which carries the slack of the track cable is 50 feet high and is also mounted on crawlers. As mentioned before, it is operated by gasoline engine power instead of electric power.

The earth is moved from the tail tower toward the head tower and dumped at the proper place under the control of the head tower operator.

Other Equipment

The search trench cut ahead of the construction of the levee to enable the engineers to determine the presence of old stumps or other unsuitable foundation material was cut by a Bucyrus-Erie dragline powered with an Atlas diesel engine and having a 60-foot boom and a 1¼-yard Page bucket. Another Bucyrus-Erie machine, a 46-B, with a 65-foot boom and a 2-yard Bucyrus-Erie bucket was used to cut down the old levee for easier handling by the tower machine and also to cut the path for the tail tower to come through the old levee when that was necessary. For breaking the sod of the area on which the levee was built and the slope of the levee enlarged, the contractor used a Caterpillar Sixty tractor pulling a gang plow. A Caterpillar Thirty-Five, with bulldozer, was used for dressing the landside slope of the completed levee.

Night Work

With the exception of the final dressing of the slopes and sodding, all operations were carried on as completely at night as during the day.

A visit to a tower machine operating at night is well worth while. My advice would be to ask the contractor to provide you with a guide so as to eliminate the dangers of barbed wire fences, stray mules and cattle sleeping in the open, and the host of dogs that live near any nigger shack.

Once you have reached the site of the operation, you find it as light as day, but with the shadows all falling away from the head-tower toward the tail tower. From the latter location it is just one glare of light like the White Way of any modern city that does not shut off its street lights to save expenses. The sequence of operations was as smooth as in the day and the only difference noted was the wisp of smoke from the track cable each time the bucket coasted back to the pit. Dirt whipped onto the cable by the hauling line caused just enough friction to produce the "smoke" which was not visible in the daylight.

Personnel

The Vidalia Point contract for the moving of 2,970,000 cubic yards of dirt was awarded to H. B. Blanks of Ferriday, La. The work was done under the direction of the United States Engineer Office, 2nd New Orleans District, Lieut. Col. J. N. Hodges, District Engineer, with D. L. White, Senior Engineer, in charge of field supervision.

Road-Mix Problems in Humid Areas

A Study of Aggregates, Road Oil, Emulsion and Cut-Back Shows Relative Advantages

LIQUID asphaltic materials of the slow-curing type have been used extensively in the Western states during the last few years in the construction of the road-mix or mixed-in-place types of surfaces. In general, they have given satisfactory results in the arid and semi-arid sections. However, these materials have not been entirely satisfactory in the more humid areas or with certain kind of aggregates, and a need has been felt for some experimental work to determine the limitations of the materials and to obtain information as to other materials and methods of construction which might be used to better advantage under these special conditions.

The California Department of Public Works undertook the construction of experimental sections during 1929 and

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Tabby Stands the Test of Time

(Photo on page 36)

Early American Material for Construction in South Has Interesting Story

THE entrance to the oldest city in the United States is guarded by the posts of the old gateway which, as part of the walls around the city, protected the little group of settlers in that land of perpetual youth. The walls are no longer standing but the gate posts are there, having withstood the elements for about 400 years. In other sections of Florida and in southern Georgia, there are a number of missions, forts and dwellings, built by the first settlers, which remain as monuments of those early days. The material used in these structures is worthy of study and is generally referred to as "tabby" or coquina.

Hard to Define

The origin of the term "tabby" seems to be lost in the haze of antiquity. Coquina, the term applied to the same type of building material in Florida, is more easily traced as it comes from the Spanish word meaning shellfish or cockle.

In John Weale's "A Dictionary of Terms Used in Architecture, etc.," published by Lockwood & Co. of London in 1873, we find the following definition: "Tabby—a mixture of lime, gravel, shells, stone and water in equal proportions which when dry becomes hard and compact as stone, and is used on the southern shores of the Mediterranean as a substitute for bricks or stone in building and, till recently, was also employed for the same purpose in Georgia, in the United States of America."

It has been suggested that tabby is derived from *tapia* which is interpreted as Spanish for mud wall. *Tapia* is defined in Webster's New International Dictionary, Edition of 1930, as:

"In Spanish countries, a building material made chiefly of clay or earth; sometimes mixed with lime and called *"tapia real."*

A member of the faculty of the University of Georgia contributes the following paragraph:

"In Glynn and McIntosh Counties, there are a number of very old buildings presumably erected by the early Spanish settlers. The tradition is that some of these buildings are 400 years old at the present time. From the best information I can gather, the supposition is that oyster shells were burned into lime. This lime was then mixed with other oyster shells and possibly some sand. The material was then firmly tamped into forms. Apparently the construction set up very much like concrete.

"In most cases all of the wood has rotted out and the bare walls are still standing. In some cases cypress poles were used as rafters and these poles are still intact. The inner surface of the walls is smooth and well-preserved. As a rule, the outer walls have weathered away appreciably. The shells were apparently harder than the material used to bind them together. This material has weathered fastest so that the shells show quite plainly on the outer walls and produce a rather roughened effect."

Method of Construction

According to other sources and personal observations, these forms, made of hand-hewn timber, were set up about 1 foot apart and from 15 to 18 inches high. Then the mixture of burned oyster shells, sand, shells and water was firmly tamped into the forms. These forms were apparently tied together by wooden dowels about 1 inch in diameter as holes are seen at the tops of each lift of the tabby where apparently some tie rod had pierced the wall, the hole later being plugged with the tabby itself.

It is interesting to note that there are no deposits of limestone on the Georgia coastal plane so that the early settlers turned to the use of oyster shells as a source of lime. These shells when burned produce a very pure calcium oxide or quicklime. Lacking building stone or brick, the early Spaniards or English settlers logically mixed the material with sand, which is necessary for stable compounds because of the marked change in volume which occurs when lime is used alone.

Tabby Differs from Coquina

A somewhat different aspect of the tabby-coquina situation has been contributed by Gadsden Smith, President and Treasurer, Van-Smith Building Material Co., Charleston, S. C. It seems that "tabby" is the fresh mixture of burnt oyster shell, sand and oyster shells, whereas "coquina" is the finished product. In examining old records, Mr. Smith found the word "tabby" but the specifications in which tabby would be used referred to "coquina" as the final product.

These specifications called for one part burnt oyster shell lime, two parts of coarse sand and four parts of oyster shells. The lime and sand were thoroughly mixed before adding water, then the shells were added and finally the water was added to give the consistency needed to work the material into place.

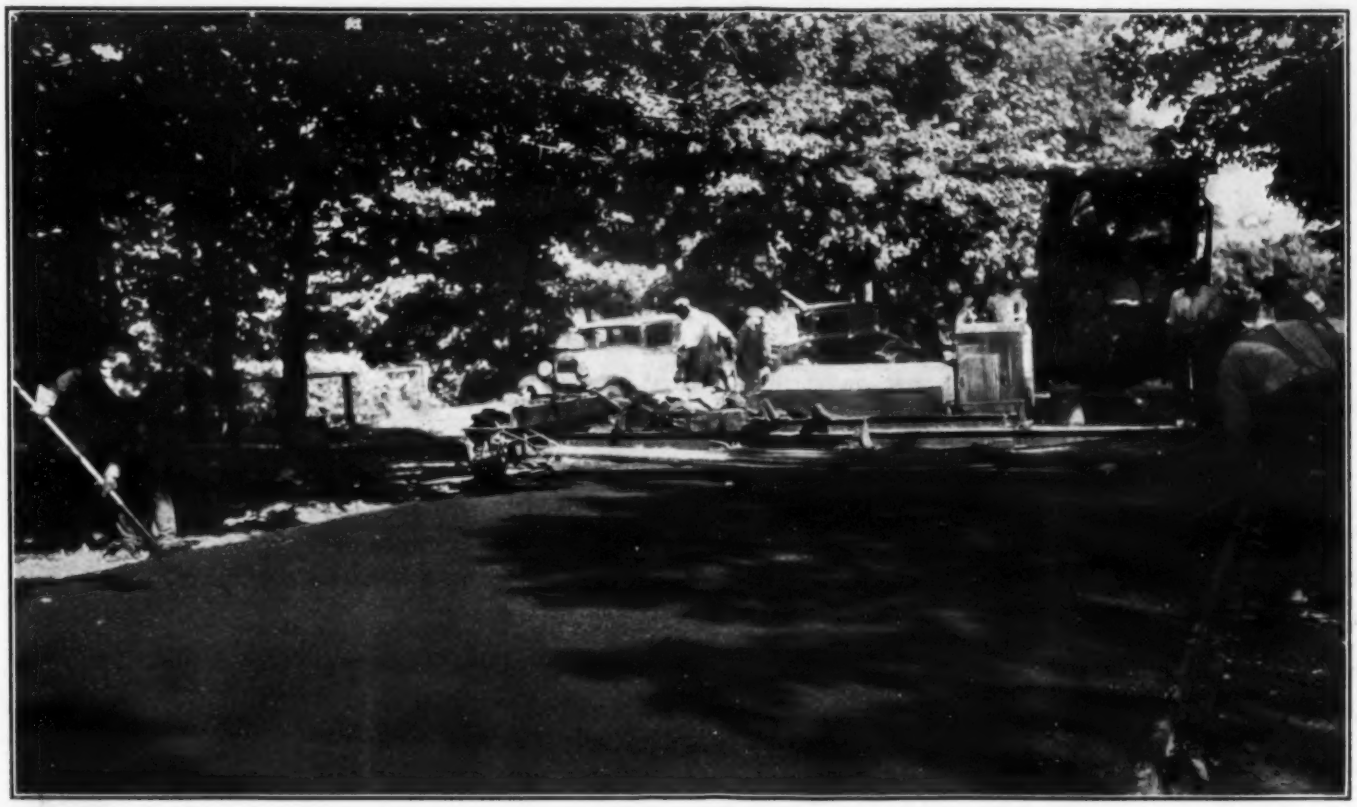
Mr. Smith refers particularly to two structures built of tabby or coquina. The old Dorchester Fort at the head of the Ashley River about 5 miles from Summerville, S. C., is an old English fort built in 1719 to protect the English settlement at Dorchester from the Indians. It is built entirely of tabby and is constructed in a saw-tooth design so that each side of the Fort is visible at

(Continued on page 21)

C. & E. M. Photo
An Old Tabby Structure, Showing the Character of Material, the Thickness of the Wall and at the Top, the Form Marks

A Simple Question:

Why have roads and streets in every state east of the Rocky Mountains been surfaced with TEXACO Asphaltic products?



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An Attribute of Greatness

Last month William Mulholland died at the age of 79. The name Mulholland is known among engineers throughout the world and to all citizens of Los Angeles and California because William Mulholland built the $24,500,000 Owens Valley Aqueduct which carries water to Los Angeles from the Sierras 250 miles distant.

We feel that William Mulholland's greatest contribution to the world was his reply to the coroner when the failure of the St. Francis Dam was being investigated. He was asked who was responsible. Mulholland was not a man for alibis and he was not a "buck passer". Looking the coroner squarely in the eye he replied, "If there was any error, human error, I alone am responsible." These may not be the exact words used, as they are quoted from memory, but they should be the motto of the engineering profession.

This story has been used many times in speaking to groups of engineering students and young engineers in active practice. It also carries a message for every man in the construction industry. A superlatively great engineer or contractor would be one who never made a mistake. But perfection is rarely achieved by mankind. The courage to accept the responsibility for an error made is the attribute of a great engineer and a great man.

Concerted Efforts to Increase Useful Work

When the Work Relief Act was passed and the initial regulations issued, it looked as though the program would permit only work of the CWA type, namely, small hand labor projects. Much progress has been made, however, toward a more reasonable program in the last few weeks.

The original limitation of $1,140 per man per year has now been interpreted as applying to the whole program instead of to individual projects. The $1,140 applies, on non-Federal projects, to the Federal grant or 45 per cent of the total cost of the project. The limitation has been lifted altogether on Reclamation Bureau and Army Engineer projects. An alternate plan on highway and grade crossing work allows a reasonably normal program in spite of the $1,400 per man per year limitation in the regulations for that type of construction.

The regulations now state that various types of contracts and projects costing more than $25,000 are to be handled by PWA under a normal contract system. The Government will purchase few materials direct, contrary to the earlier announcements from Washington. Instead of through a centralized bureau, the purchases will be made in the district and more or less determined by the individual projects. On housing projects, the requirement that 90 per cent of the labor be taken from the relief rolls has been eliminated.

In order to insure a more nearly normal program, the Executive Committee of the Construction League of the United States has established a Committee on Useful Employment which will conduct a campaign for a balanced work program under the Work Relief Act. The League is thus continuing its outstanding position as the leader of the Construction Industry. Its initial master effort since new deal policies emanated from Washington was the formulating of the Construction Code. When NRA ended, the League immediately began to consolidate the position of the construction industry by endeavoring to secure the cooperation of all parts of the industry in continuing in effect the beneficial elements of the Construction Code.

Highway Funds Available If They Can Be Spent

The Federal Government has made available large sums of money for highway construction. The interesting situation has developed that the amount of money available for the Highway Program will depend upon the speed with which the present funds are put under contract. The faster these funds are put to work, the more likely it is the Federal Government will provide additional financing.

There is at present $200,000,000 immediately available for highway construction. Of this sum 25 per cent is to be spent for secondary or feeder roads which are not on State or Federal systems and 25 per cent is to be spent within municipalities. The remainder is to be spent for Federal and State highway construction. In addition, there is another $200,000,000 available for grade crossing projects.

The states have three optional plans for the utilization of work program highway funds. First, all projects can be measured on the basis of providing the equivalent of a man-year of employment at a cost to the Federal Government of $1,400, the state to supply any additional funds that may be necessary to complete the project. The Federal Government's obligation is limited to $1,400 per man-year or its equivalent of 90 cents per man-hour of employment. Second, the state may enter into an agreement to give employment from relief rolls to its full quota of individuals determined by dividing the State highway allotment by the allowable expenditure of $1,400, or to provide the equivalent in man-hours of employment on the basis of 1,560 man-hours of employment per year. The state may agree to give employment at determined wage rates and hours for a period of one year, or the equivalent man-hours of employment on highway work under direct supervision of State Highway Departments.

These are the rules under which State Highway Departments must play the "game." Immediate action with projects properly proportioned will mean that the states will receive complete quotas of Federal funds, reduce the relief rolls and also give contracting organizations opportunities to keep their employees off the relief rolls.

Give Skilled Laborer His Rightful Place

To the Editor
Contractors and Engineers Monthly

I have just completed reading the article "Skilled Laborers Hit by Relief Labor" by Charles B. Cochran, in your June issue. To me this is one of the most interesting and fact stating articles I have read in some time. I have been up against the situation regarding skilled labor exactly as described by Mr. Cochran.

As I am only a small contractor, it has been necessary for me at times to put in part of my time in the employ of some larger contractor. There is no work in my line in the county in which I live and it is impossible for me to get employment in a county 50 miles away where there is an abundance of work in my line, regardless of whether the contractor is willing to have me work or not.

Up until two years ago I had a small organization of men on whom I could depend on any work in our line which is sewer and water line construction. Since the invention of "relief labor," these men have had to stand by and watch the work, of the kind they have been doing for as long as twenty years, being done by men who never saw this kind of work done before.

As we all know, a contractor is very seldom working in his own home community. As a result, most of his skilled men choose their residence to fit the job. I know of several skilled laborers who really have no permanent residence but have lived in this state for ten years or more. I believe that steps should be taken to have the labor clause in contracts changed so that a skilled laborer who has been a resident in the state for at least five years will be permitted to work on relief projects and then take common labor from the relief rolls of the agencies of the city or county in which the work is located.

Since the Federal Government is increasing the amount of work of this type, I believe that the first step should be to put the skilled laborer back on his rightful job. The safety factor alone should be enough to convince the authorities that this is the proper thing to do.

One large contractor, who had given me a job as foreman, which I was not permitted to accept because I had not been a resident of that city for over one year, told me that he would not bid on another unit of work because of the existing labor requirements. I have also noticed that bid prices are increasing on contract work and I attribute this largely to the labor situation. If any money can be saved by giving the skilled man his rightful place, by all means let us do it, and use the money thus saved to do more work.

M. J. Patrick,
CONTRACTOR.

San Jose, Calif.
June 19, 1935

Awarding Unit Should Bear Expense of Plans

To the Editor
Contractors and Engineers Monthly

Recent letters concerning the charge frequently made for the use of plans by contractors have been mostly from consulting engineers. They have good and sufficient arguments showing why the engineers should not pay for the expense involved in supplying the plans and specifications.

But none has thus far presented a logical argument in support of charging contractors for the plans. Contractors go to a great amount of expense figuring prospective work; maintaining engineers and office help to make quantity surveys and then properly price the various units of work involved. In addition, there frequently are travel and hotel bills to be paid. Recently there has been added to this burden the frequent charge for plans.

Costs of estimating and securing work are legitimate expenses of the contracting business similar to the sales expense of other lines of endeavor. They must of course be paid out of the selling price, which in the contracting business is the contract price of work secured. Additions to these legitimate costs must naturally be reflected in the prices bid on proposed work.

The cost of supplying the plans should be borne solely by the city or awarding unit. The city benefits by competition; it should be willing to pay for that benefit by supplying plans free to contractors or by refunding reasonable deposits. Were this universally done it would be equitable for the city also, for it would be paying only for the benefits it received, and not for charges made by other cities which contractors now are obliged to add to all their bids.

Some consulting engineers, I note, agree that the cities should pay these charges. Why do not all engineers word their contracts with the cities so that neither they (the engineers) nor the contractors have to stand these costs?

Let's put the right shoe on the right foot.

Grant M. Hinkamp, VICE-PRES.,
G. R. Fehr, Inc., CONTRACTORS.

Milwaukee, Wis.
June 18, 1935

Safety Posters Help

In the past few years, when jobs were scarce and profits low, it has been easy for contractors to protest that they couldn't afford safety engineers, and that safety devices were too expensive to purchase. This, of course, is false economy. It has become platitudinous to remark that safe practices add to rather than reduce profits. But the idea still persists in the minds of some contractors that safety measures involve too great an expense.

There is one inexpensive but helpful measure which keeps before all the men on the job the necessity for carefulness, and points out how that carefulness may be practiced. These are the safety posters which are available at a nominal cost from the National Safety Council, Inc., 20 North Wacker Drive, Chicago, Illinois. Reproductions of these posters have appeared on this page from time to time, carrying home the message of safety in a striking, effective manner.

It is more important now than ever before that such educational measures be taken, because of the large per cent of men working on construction jobs who come from the relief rolls, who are unaccustomed to that type of work and who may need particularly the reminder of the value of safe practices in carrying on their jobs.

Work at Grand Coulee Ahead of Schedule

By HENRY W. YOUNG

(Photo on page 36)

PROGRESS on the Grand Coulee Project of the Mason-Walsh-Atkinson-Kier Co., in north central Washington, was well ahead of schedule on May 1. At that time, final decision had not been made as to whether this project would be extended into the proposed "high dam" stage, involving power production plus irrigation, or be completed as a "low dam" for power production only. The above contracting organization has the contract for the major part of the excavation and the building of the low dam and power plant.

Early in June, the contractor signed a change order, authorizing the construction of the foundations for the high dam. This is believed to be the first step toward the authorization of the completion of the high dam and ultimately the vast Columbia Basin Irrigation Project.

The method of construction has been such that the work can be extended to include the high dam without involving changes in the engineering or construction aspects of the job.

The ultimate high dam will be erected to Elev. 1,307 feet, thereby raising the Columbia River at this point some 355 feet and providing storage of 5,028,000 acre-feet. It would generate 1,890,000 kw. Of this power, about 500,000 kw would be used to pump water 365 feet from the reservoir up over into Grand Coulee, the prehistoric channel of the Columbia, forming a reservoir of 230,000 acre-feet, some 23 miles in length, and serving mainly as a water conduit, irrigating 1,200,000 acres of highly fertile land. Such a project represents an investment of about $376,000,000, of which $168,000,000 would be for the dam and power house.

Work on Low Dam

In the meantime, the work is going ahead on the low dam, the top crest of which will be at Elev. 1,116 feet. This involves practically all of the excavation necessary to the ultimate project. The low dam will be a straight gravity dam 3,700 feet long. In addition, there will be built a permanent concrete cofferdam about 400 feet below the axis of the main dam. This will be erected to Elev. 935 feet and will form the toe of the high dam. If and when the latter is decided upon, it will then be but a matter of extending the low dam structure on up to the ultimate height.

The power house will be erected in two sections, one on each side of the river, and the present contract, calling for the erection of three units of the west half of the power house, also calls for the building of the east half of the power house substructure up to a point permitting subsequent unwatering and completion when the high dam project may be authorized.

General Method

The general method for the construction of the low dam was first to build a U-shaped cofferdam on the west side of the river, remove the overburden, excavate to bed rock for the power house substructure and west dam abutment and build both up part way. This cofferdam has been practically completed and excavation is going on at a rapid rate.

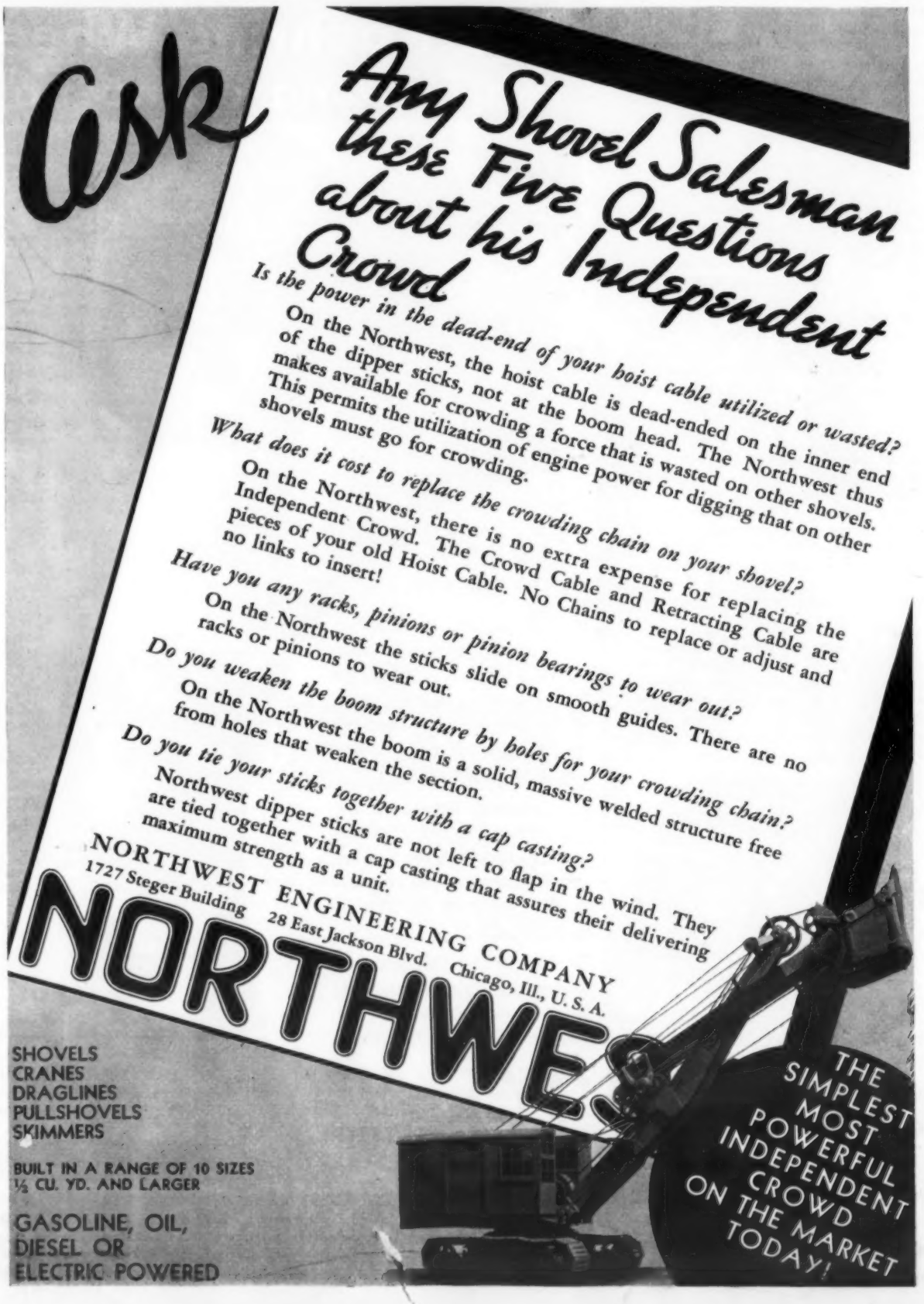
With the coming of low water this fall, the east cofferdam will be similarly built, excavated and the substructure built. Then the central section of the cofferdam will be constructed, diverting the water to the partially constructed west end. After the central section of the dam has been concreted, the low portions left for diversion purposes will be raised to completion.

The total amount of excavation involved in the M-W-A-K Co. contract is something over 13,000,000 cubic yards, of which 5,000,000 cubic yards had been disposed of by May 1 of this year. It is estimated that four years will be required to complete the low dam project from the start in 1934.

(Continued on page 23)

M-W-A-K Co. Installed Mile of Belt Conveyors to Speed Dirt Moving on Washington Project

Part of the Main Line of the Conveyor Units Extending From the Bottom of the Excavation to the Brink of Rattlesnake Canyon Where 5,000,000 Bank-Yards of Material Was Dumped in the First Five Months of Operation.


Ask
Any Shovel Salesman these Five Questions about his Independent Crowd
Is the power in the dead-end of your hoist cable utilized or wasted?
On the Northwest, the hoist cable is dead-ended on the inner end of the dipper sticks, not at the boom head. The Northwest thus makes available for crowding a force that is wasted on other shovels. This permits the utilization of engine power for digging that on other shovels must go for crowding.
What does it cost to replace the crowding chain on your shovel?
On the Northwest, there is no extra expense for replacing the Independent Crowd. The Crowd Cable and Retracting Cable are pieces of your old Hoist Cable. No Chains to replace or adjust and no links to insert!
Have you any racks, pinions or pinion bearings to wear out?
On the Northwest the sticks slide on smooth guides. There are no racks or pinions to wear out.
Do you weaken the boom structure by holes for your crowding chain?
On the Northwest the boom is a solid, massive welded structure free from holes that weaken the section.
Do you tie your sticks together with a cap casting?
Northwest dipper sticks are not left to flap in the wind. They are tied together with a cap casting that assures their delivering maximum strength as a unit.
NORTHWEST ENGINEERING COMPANY
1727 Steger Building 28 East Jackson Blvd. Chicago, Ill., U. S. A.
NORTHWEST
SHOVELS
CRANES
DRAGLINES
PULLSHOVELS
SKIMMERS
BUILT IN A RANGE OF 10 SIZES
½ CU. YD. AND LARGER
GASOLINE, OIL,
DIESEL OR
ELECTRIC POWERED
THE SIMPLEST MOST POWERFUL INDEPENDENT CROWD ON THE MARKET TODAY!

Vibrating Concrete Studies in Illinois

Better Concrete Secured Than by Hand Methods of Consolidation

By V. L. GLOVER, Engineer of Materials, Illinois Division of Highways

PLACING concrete mixtures with vibratory equipment is a comparatively recent development, although the principle is not new and was tried experimentally on laboratory specimens more than a decade ago. The successful placing of mixtures by vibration under actual construction conditions, however, has depended upon the development of proper equipment with which to perform the operation satisfactorily.

The compaction of concrete in structures by vibration is required at present in many states; the compaction of pavement concrete by means of finishing machines equipped with vibratory screeds is, so far as I know, required in only one state. Illinois requires vibration of concrete in all structures having a span of 20 feet or more. For smaller structures, hand and vibratory methods are optional with the contractor.

Vibration Superior

One season's construction has been completed under these specifications, and while a complete study has not been made of the data obtained, it is felt that vibration is far superior to hand methods in consolidating the concrete. On the other hand, it has become apparent that knowledge of the vibratory equipment employed in this work is inadequate. There may not be sufficient power behind some vibrators and there may be a too pronounced damping of the vibration when the vibrators are inserted into the concrete.

Various suggestions, such as limiting the output of concrete or limiting the size of mixer, have been considered. Before such suggestions can be considered seriously, some additional information must be obtained. To this end, the Illinois Division of Highways is procuring vibrating reed tachometers for studying the frequency of vibration obtained with the equipment employed.

Proper Mixtures

The selection of concrete mixtures for use with vibratory equipment has been characterized by a certain conservatism. The full benefit in saving of cement without reduction in quality of concrete through the use of vibratory equipment may not have been realized. Conservatism is desirable so long as the method of procedure is experimental or semi-experimental, especially since the concrete in test specimens cannot be vibrated in the same manner as that in structures.

On the average, therefore, the weight of sand per bag of cement has been kept about the same and the amount of mixing water about the same or a little less than when hand methods are used. On the other hand, the amount of coarse aggregate has been increased to conform with the ability of the equipment to place the mixture. The consistency of the concrete was varied to suit the particular condition, the slump ranging from 1 to 4 inches with an average of 2½ inches. Probably the saving in cement did not exceed one-fourth bag per cubic yard of concrete.

Quality of Concrete

Under these conditions it would be expected that the quality of the con-

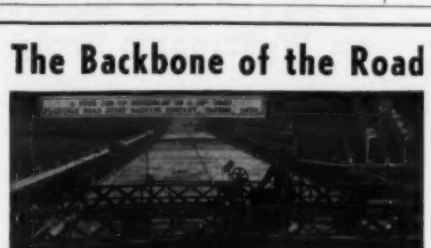
(Continued on page 18)

Universal Atlas Cement Announces Appointments

Several new appointments in the Universal Atlas Cement Co., a subsidiary of the United States Steel Corp., have recently been announced. R. M. Beaton will serve as District Sales Manager in New York, in charge of metropolitan New York and northern New Jersey territory; B. J. Whittaker has been appointed District Sales Manager in Albany, in charge of the New York State territory; and C. L. Whalley will act as Assistant District Sales Manager in Newark, in charge of the northern New Jersey territory, under the supervision of Mr. Beaton.

All the new appointees are under the direction of A. O. Stark, Sales Manager, New York.

The Backbone of the Road



FLEX-PLANE Contraction Joints are equivalent to the vertebrae of the human body. They provide flexibility and prevent cracking and deterioration.

Finishing Machines for Concrete and Black Top. Combination Dowel Rod and Expansion Joint Holders. Contraction Joint Installers.

FLEXIBLE ROAD JOINT MACHINE COMPANY WARREN, OHIO

The Koehring Wheel Dumptor
for hauling · dumping · spreading

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NO major break-down after years of dirt-moving service — often 24 hours daily — in rock excavation — grading — quarry stripping and many other types of work.

Our records reveal an astounding lack of replacement part orders for Koehring Dumptors—so emphatically few, to be almost unbelievable.

Write us for information about the "almost negligible" maintenance cost of Koehring Wheel Dumptors.

20 MILES per HOUR

Special axle design for tough hauling work — 4" chrome nickel axles in one piece alloy steel housing — large tapered bearings — *no failure here.*

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Pavers · Mixers · Shovels · Cranes · Draglines · Dumptors · Mud-Jacks
3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

AIR COMPRESSOR from FORD PARTS

With the patented Smith Compressor Head you can now build your own Motor-Compressor with 60-cubic foot capacity. Head is furnished with high-speed compressor valves over two cylinders, unloader and complete instructions for mounting on your Model A or B Ford Motor. These Motor-Compressors are now being used in over twenty states for drilling rock, breaking pavement, riveting, sand blasting, painting, etc.

Write for full information and prices.

GORDON SMITH & COMPANY
Incorporated
1220 State St. Bowling Green, Ky.

Adv.

Cost of Road Rolling Reduced . .

New Process Eliminates Cross Rolling and Provides Better Finished Surface

ELIMINATION of cross rolling and the speed with which compaction and surface smoothness is accomplished with the Austin-Western Roll-A-Plane, is showing effective savings in road construction costs throughout the country. Lower first cost and lower maintenance charges made possible by this recent development in roller construction are giving both the contractor and engineer a new conception of the possibilities of black top roads.

Reason for Present Specifications

Until recently mechanical limitations of conventional rollers have caused engineers to look upon rolling for compaction and rolling for surface smoothness as a single operation.

With hot or cold asphalt binders the practice has been to roll the material for compaction and some degree of surface smoothness following this first operation with cross or diagonal rolling to eliminate irregularities caused by voids in the material.

As every road builder knows the compaction of an asphaltic pavement is quickly accomplished; proper density and stability are normally achieved before a quarter of the usual rolling has been completed. The remaining three-fourths of the rolling time is spent in obtaining surface smoothness. This constant rolling while it brings the surface to the required tolerance has one serious defect in that the cross rolling can not be completed before the hot material grows cold or the volatile oils in the cold type have escaped. In both cases the weight of the rollers tends to fracture the bond already set up thus creating checks and cracks in the surface, and causing the early disintegration of the pavement.

Because of this time element, limitations of areas to be rolled at a given time specifications as to the number of rollers to be used and regulation of the size of rolls on the rollers were developed as the best expedients for protecting the road surface. Naturally these regulations were makeshifts due to the limitations of available equipment.

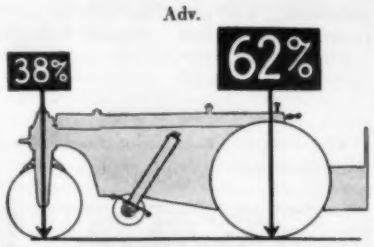
The Roll-A-Plane Process

With the introduction of the Roll-A-Plane defects of the old method can now be eliminated. Compaction is obtained using this machine as a conventional roller. The moment proper compaction is accomplished the small center roll between front and rear rolls is let down to form a true plane between the standard rollers. (See diagrams.) As this small diameter roll comes into play it relocates the material to create surface smoothness, develops a greater and more uniform density of material because of the small diameter of the center roll, and accomplishes this BEFORE the bitumen has had time to set—, at a time when relocation of the asphalt still permits of an intimate rebinding.

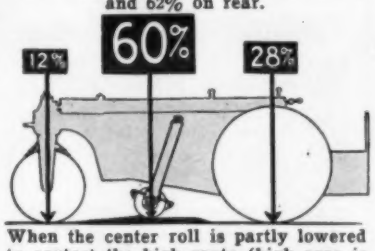
Because the three rolls running in a plane operate as a moving straight edge it is obvious that surface smoothness is obtained very rapidly and that the moment this second stage of the rolling is completed the job is done. Any further rolling of the completed surface could add nothing to the compaction or smoothness of the material and would tend to rupture the bond just as when old fashioned rollers are used.

Details of construction and application of the Roll-A-Plane may be had by writing to the Austin-Western Road Machinery Co., at Aurora, Illinois.

Adv.



As a conventional roller, operates with about 38% of the weight on front roll and 62% on rear.



When the center roll is partly lowered to contact the high spots (high area is shown exaggerated for the sake of illustration) roller weight automatically shifts to center roll to bear down and level out such spots.

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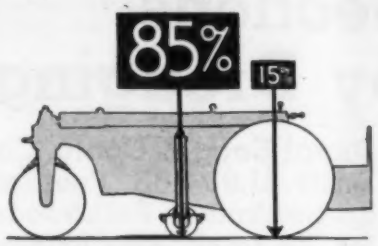

Further lowering of center roll progressively builds up an increasing proportion of weight to a point where high areas cannot resist the tremendous compaction and levelling action.

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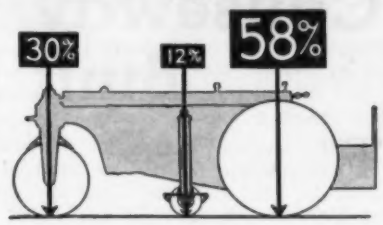
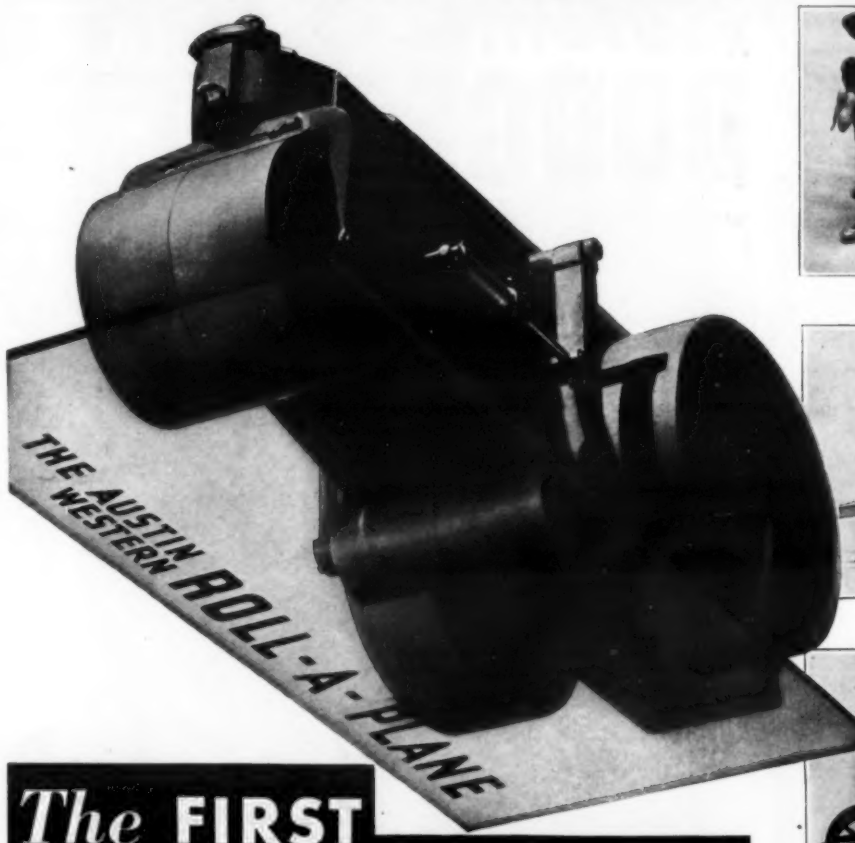


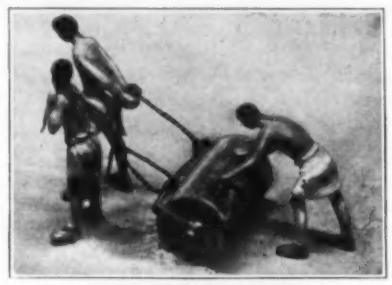
The moment the surface becomes level and smooth, roller weight automatically shifts back to the larger rolls, leaving very little pressure on center roll. A slight variation in pavement levelness, however, will immediately transfer the weight back again to center roll.

Diagrams showing the four stages of road rolling when the Austin-Western Roll-A-Plane is used to obtain compaction and surface smoothness.

NEW ROAD ROLLING PRINCIPLE

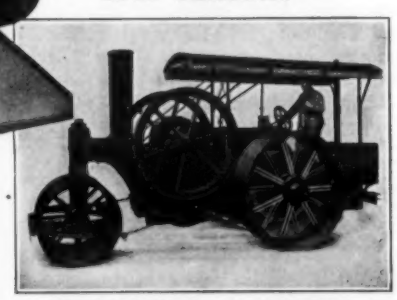


The FIRST in 1,935 YEARS

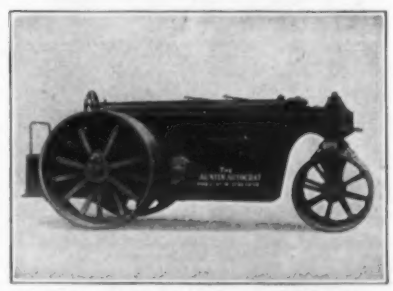


THE YEAR 1 B.C.

19th CENTURY



EARLY 20th CENTURY



1930—THE AUSTIN AUTOCRAT

● Through nineteen centuries the principle used for rolling roads remained the same—*compaction by a rolling weight.* Today the Austin-Western Roll-A-Plane brings the industry a new principle—*compaction by a rolling plane*—and accomplishes a better result for less money—in 1/3 less rolling time.

All rollers have been directed to the same purpose: (1) to reduce voids in the pavement, thereby increasing its density and stability, and (2) to produce surface smoothness for riding comfort and reduced road wear. The Roll-A-Plane is essentially a new machine for accomplishing this purpose more completely and effectively.

A small diameter roller located between the larger rolls eliminates the tendency of the conventional roller to follow the contour of the highway. As it meets a high spot a constantly increasing pressure up to 90% of the roller weight is exerted—the kneading, compacting "spot pressure" performs the leveling operation more uniformly than ever before. The result is a smoothness which materially reduces the cost of road maintenance. Write for latest bulletins.

The Austin-Western Road Machinery Co.
Y, Aurora, Ill.
Please tell me more about the Austin-Western Roll-A-Plane.
Name.....
Address.....
City ..... State.....

ROAD GRADERS · MOTOR GRADERS · ELEVATING GRADERS · DRAGS

ROAD ROLLERS

Austin-Western

DUMP WAGONS

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DUMP CARS

CRUSHING AND WASHING PLANTS · SWEEPERS AND SPRINKLERS · SHOVELS · CRANES · ETC · SNOW PLOWS

Causeway Sections Built by Dredging

Duval Engg. & Contg. Co. Built 11,004.63 Feet of Embankment, Bulkheads for Apalach. Bay Bridge

THE causeway sections of the new Apalachicola Bay Bridge, at Apalachicola, Fla., comprise three sections of 5,999.56 feet, 2,999.56 feet and 2,005.51 feet in length. These were all built by hydraulic dredging from the Bay to form embankments with a height of 6 feet above mean tide, a 100-foot wide crown from shoulder to shoulder and with 10:1 slopes sodded both sides with grasses taken from nearby marshes in the same brackish water. The causeway ends are protected for 200 feet back with circular sheet steel piling cofferdams of piles of 29 feet maximum length and tied by webs of interlocking piling. The cofferdams were driven on a 21-foot 7¾-inch radius and serve to protect the embankment from wash and undermining in the tidal flow due to the restriction of the flow area by the completion of these hydraulic-fill embankments.

The contract for the dredged embankment was awarded to Duval Engineering & Contracting Co. of Jacksonville, Fla., for $222,550.61 and called for the placing of 852,000 cubic yards of embankment and the driving of 1,844,000 pounds of sheet steel piling in the protective cofferdams.

The Dredge Reliable

The dredge used for the placing of the hydraulic embankment was formerly a U. S. Engineer Corps dredge and was purchased by the present owner and placed in service for dredging and levee construction. The Reliable is a 31 x 100-foot dredge carrying a complete steam dredging outfit. A 350-hp Scotch marine-type fuel-oil fired boiler provides the power for the operation of the 300-hp compound engine which drives the main 12-inch Morris pump through a 20-inch belt. A Flory 5-drum steam hoist handles the anchors, spuds, and 40-foot ladder. A Lambert steam engine drives the cutter which consists of a 52 x 48-inch spider blade. The dredge suction is 14-inch and the discharge 12-inch. The engine-room crew per shift consists of only an engineer or oiler and the fireman. The dredge readily handles 4,000 feet of discharge line with a pressure of 65 pounds and a vacuum of 12 inches on sand. The Reliable has run as much as 8,000 feet of line with a maximum pressure of 85 pounds.

The anchor lines are run out 800 feet on either side of the dredge, permitting a radius of action of about 800 feet. With the 4,000-foot discharge line the dredge delivered 6,500 cubic yards per 24 hours or 5,000 yards net in place with a crew of fourteen men, including seven on the dredge and seven on the fill.

The pontoon line varied in length from 500 to 1,000 feet and was in 48-foot lengths carried on two cylindrical pontoons. The pipe line lengths varied from 12 to 16 feet. Standard flexible rubber sleeves were used for connections on the pontoon line.

On the Dump

The Reliable was maintained close to the Apalachicola end of the embankment and the causeway fill built out away from the dredge. When that area gave out of suitable material, another still within the area defined by War Department permit and just off the main channel for the ferry was selected, which greatly shortened the pipe line.

(Continued on page 16)

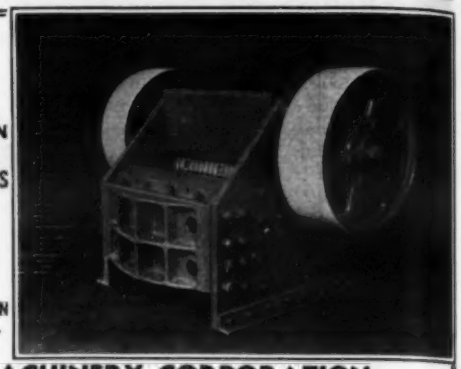
Good Roads MACHINERY

"GOOD ROADS" CHAMPION
COMPLETELY PORTABLE ROCK CRUSHING and SCREENING PLANTS

"Efficient in production—low maintenance cost."

The "Two in One"
"GOOD ROADS" ROLLER-BEARING CRUSHER
REDUCING TO FINES IN ONE OPERATION

Complete plant machinery for Quarries—Sand and Gravel Pits



GOOD ROADS MACHINERY CORPORATION
KENNETT SQUARE PENNSYLVANIA

JACKSON
CONCRETE VIBRATORS
are
DEPENDABLE

Easy to handle, economical, these machines do a better job and do it day after day, without interruptions in service and with definite savings in cement and labor. Several sizes, internal and external types. Portable power plants if desired. Write for information.

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

Now...a 3-TON DODGE TRUCK *at* $1695*

20,000 LBS. GROSS CAPACITY
32,500 LBS. TRAIN WEIGHT
At last Dodge has produced the 3-ton truck heavy-duty haulers have demanded. Priced with the lowest ...famous Dodge features that save you money—an ideal truck for inter-city haulers, warehouse firms, dump truck users and many others.

DOZENS OF EXTRA FEATURES THAT CUT COSTS... PROLONG TRUCK LIFE... AT NO EXTRA COST!

5-SPEED TRANSMISSION—A costly Dodge feature that insures ample power under all load, grade or road conditions. Quiet helical 4th gear like an extra high gear. Makes it easy to maintain maximum road speed.

VACUUM BRAKE BOOSTER—Another high-priced Dodge feature ...gives greater protection to drivers, trucks, loads; makes stops easy. More comfort and ease for the driver. Combined with safe, quick-stopping Dodge hydraulic brakes this finer Dodge feature works daily to save money on tires—brake adjustment, and relining expense.

FULL-PRESSURE LUBRICATION—Dodge gives you full-pressure lubrication and an oil filter ... insures clean oil, free from grit, at every bearing. Saves oil ... cuts repairs ... adds to life of your truck.

HYDRAULIC BRAKES—They stay equalized... avoid skidding ... eliminate need for constant readjustment ... save money on tires and brake relinings.

DODGE has pioneered for 18 years in building fine dependable trucks. Now comes this great new 3-ton Dodge. Its low price is a sensation, only $1695* for a 20,000 lbs. gross capacity 3-ton truck! Yet like all other Dodge trucks, it brings you saving features, such as you would expect only on much higher-priced trucks. Such features as a 5-speed transmission for great flexibility with a helical fourth gear capable of sustained, quiet operation—5 piston rings instead of 4 ... to give better compression ... save gas and oil. Hydraulic brakes avoid skidding and swerving ... save money every day on tires, brake adjustments and relining expense.

And these are only a fraction of the finer features Dodge has put on the new Dodge 3-ton truck, to save you money on gas, oil, tires, upkeep ... and to add years to the life of your truck. You have no idea how much value your truck money can buy until you have seen this new 3-ton Dodge. Your local Dodge dealer has complete details and will be glad to quote on a Dodge truck to meet your needs.

DODGE DIVISION—CHRYSLER MOTORS

**List prices at factory, Detroit, subject to change without notice. Special equipment, including dual wheels on 1½-ton models, extra. Time payments to fit your budget. Ask for the official Chrysler Motors Commercial Credit Plan. (Dodge passenger cars $645* and up.)*

Dependable DODGE TRUCKS

½-TON CHASSIS, $365* — 1½-TON CHASSIS, $495* — 2-TON CHASSIS, $895* — 3-TON CHASSIS, $1695*

Welding 5 Miles of Pipe Daily on Western Oil Line

Despite severe dust storms, high winds and occasional rains, the first section of a new pipe line from Enid, Okla., to Hutchinson, Kans., for the Cimarron Pipe Line Co. is being welded at the rate of 5 miles per day. The complete line will extend from Enid to Superior, Nebr., and will have an estimated capacity of 20,000 barrels of gasoline per day.

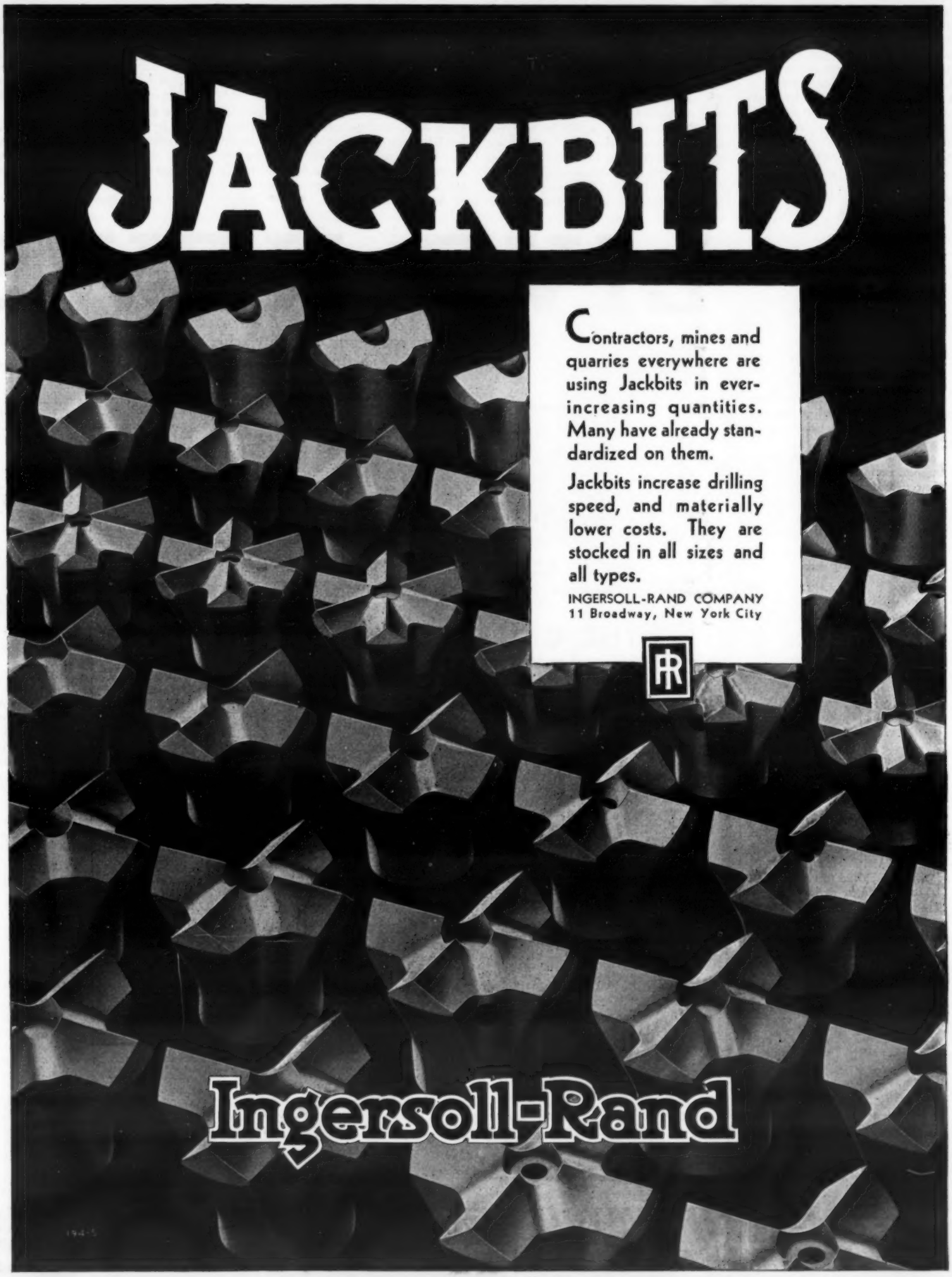
This pipe line is being constructed of 6-inch diameter, 14-pound seamless steel pipe in an average length of 40 feet. Joints of plain butt type are being used. At the end of 29 days from the time work was started, over 160 miles of pipe had been welded, an average of 730 welded joints a day.

H. C. Price, Inc., of Bartlesville, Okla., contractor for the welding on the southern half of the project, is using Lincoln Shield-Arc welding equipment for this job.

New Edition on Highway Engineering

The second edition of "Principles of Highway Engineering" by Carroll Carson Wiley, C. E., Associate Professor of Highway Engineering at the University of Illinois, has recently been announced by the McGraw-Hill Book Co. This volume, which is essentially a modernization of the first volume, is designed not only as a text book but also as an auxiliary and reference book for highway engineers interested in design and administration.

Copies of this book are available from the McGraw-Hill Book Co., 330 West 42nd St., New York City. The price of this book is $4.00.


JACKBITS
Contractors, mines and quarries everywhere are using Jackbits in ever-increasing quantities. Many have already standardized on them.
Jackbits increase drilling speed, and materially lower costs. They are stocked in all sizes and all types.
INGERSOLL-RAND COMPANY
11 Broadway, New York City
Ingersoll-Rand

Natural Sand-Clay Base Toughened With Gravel

Base Primed With Tar, Top Treated with Asphalt on Georgia 6.8-Mile Job

A CONTRACTOR well versed in the laying of lime-rock bases for highways was awarded the contract for the construction of the 6.8-mile project from Buena Vista, Ga., west to the county line. M. J. Carroll comes from lime-rock country and where that material is available at low cost, stabilizing the base means only placing and rolling the material that nature has supplied in such abundance. There is no lime-rock about Buena Vista but there is a natural sand-clay soil that can be made into a substantial base by the addition of gravel, and this article will describe the methods used by this contractor under Georgia specifications.

Preparing the Subgrade

About the middle of June, 1934, the contractor started coring out the form trench where it was too deep to do it economically by hand. This work was done by Caterpillar Sixty and Thirty tractors pulling Adams 12 and 10-foot graders respectively. The forms were pine lumber 2½-inch x 10 inches in random lengths not under 10 feet and were set flush to take care of compaction for the 8-inch base to be prepared. These forms were staked with wedge shaped stakes made from 2 x 4's in 18-inch lengths cut diagonally, which were driven inside and outside at the ends of every length of form and at the mid points. The form crew consisted of a foreman and six laborers.

The grade was then shaped uniformly to a template and both graders and a hand crew of fifteen men were used. Immediately following this the sand-clay base was placed, and the forms were pulled before any stabilizer gravel was spread.

The Toughening Process

Gravel passing a 1½-inch screen and not more than 16 per cent retained on a ¾-inch screen was delivered by rail in gondola cars from the pit of the Georgia Gravel Co., at Columbus, Ga., unloaded into trucks by hand and hauled to the job. It was spread from the tail-gates of the trucks and hand-spread uniformly to a 2-inch depth by brooming. Immediately following the spreading, the gravel was mixed with the sand-clay base by pulling a Killefer rooter and a double disc harrow over the base repeatedly until the material was thoroughly mixed to a depth of 8 inches.

The material was then bladed to a true crown as shown by a template. The crown was 2 inches for the 21-foot roadway and flat on all superelevated curves. The base was then rolled to compaction with a 10-ton Buffalo-Springfield gas roller. This left the base so that a loaded wagon with steel tires could run over it without showing any marks of the wheels.

Surface Treatment—Priming

The base was primed with Koppers Tar, T3, which penetrated the surface to a depth of as much as ¾-inch. The tar was delivered by tank car to Buena Vista at the east end of the job and to Putnam at the west end and hauled to the grade in an Etnyre 600-gallon distributor mounted on an International truck. The prime was allowed to dry out for three days and then traffic was allowed on the road to anneal the surface. Traffic blocks were used to force traffic to use the entire surface and not confine travel to any one section.

Applying the Road Metal

Before any slag was applied to the road, and even before the asphalt was applied for the double surface treatment, the surface was thoroughly swept with an Austin rotary broom pulled by one of the trucks to remove any excess material that had been lifted by traffic from the tar-primed surface of the base course.

The tack coat of the surface treatment consisted of 0.45-gallon of asphalt of a penetration of 180-220 applied by the distributor. On this, No. 3 slag, all of which must pass a 1½-inch screen and included sizes down to ¾-inch, was spread with Galion spreader boxes to a depth of 1 inch and hand-spotted by a crew of six men. The slag was delivered to Buena Vista by freight from the Birmingham Slag Co., of Birmingham, Ala., and unloaded with a Bucyrus-Erie gas crane with a 60-foot boom and a ¾-yard Owen clamshell bucket direct to the fleet of six trucks which had a ¾-mile dead haul to the east end of the 6.8-mile contract.

The slag was keyed into the primed base by rolling with a 5-ton Austin-Western tandem roller, setting the material about ¼-inch into the base and holding it firmly with the asphalt tack coat.

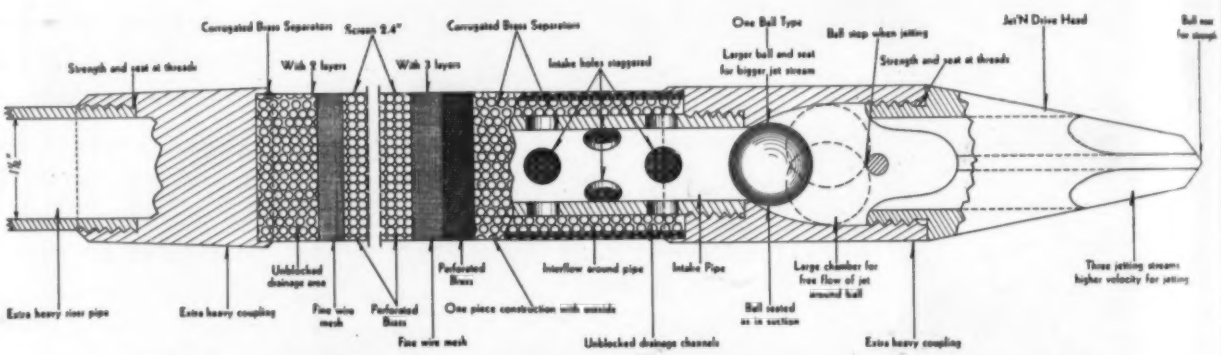
(Continued on page 24)

C. & E. M. Photo

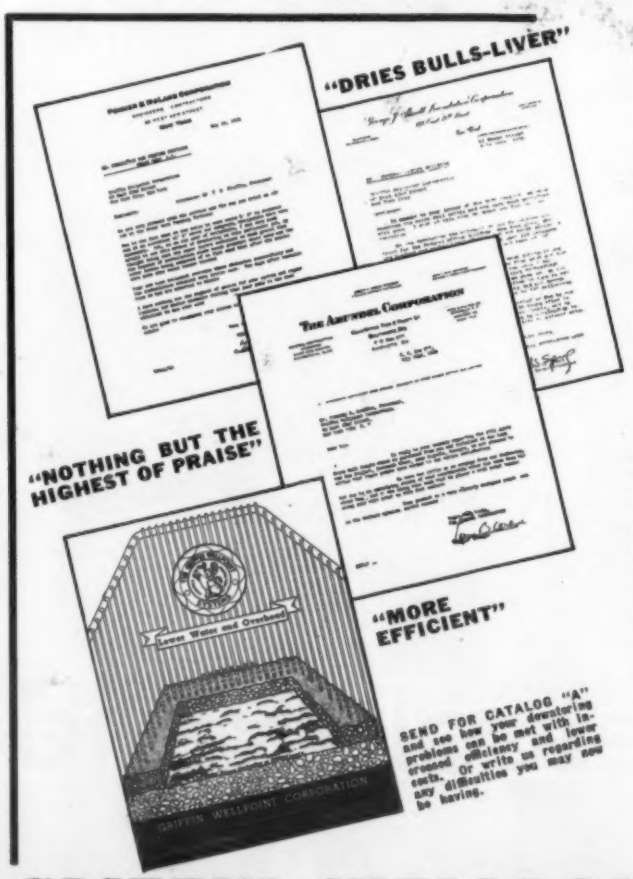
Spreading Top Soil on Shoulder of Finished Road

LIVE NEWS

Record speed and economy achieved on difficult dewatering jobs by new jetting wellpoint that also penetrates gravel or hard subsoils.



THE GRIFFIN JET'N DRIVE WELLPOINT


"DRIES BULLS-LIVER"
"NOTHING BUT THE HIGHEST OF PRAISE"
"MORE EFFICIENT"
Lower Water and Overburden
SEND FOR CATALOG "A" and see how your dewatering problems can be met with increased efficiency and lower costs. Or write us regarding any difficulties you may now be having.
GRIFFIN WELLPOINT CORPORATION

Speculation and delays have been eliminated on wet jobs with the use of the new Griffin Jet'N Drive Wellpoint. Installation expense has been reduced, more water has been pumped per hour with less horsepower and lower maintenance costs, fewer replacements have been required and dry subgrades obtained where other wellpoints have failed. These are not merely claims. They are actual results obtained by leading construction companies now using the Griffin Jet'N Drive Wellpoints. Engineers' reports and repeat orders prove their efficiency and economy.

The increased profit on a single job may more than pay for the cost of replacing your present system with Griffin Jet'N Drive Wellpoints. The continued use of antiquated equipment invites trouble, costly delays and penalties. Write for our catalog "A" and special rental and sale propositions—TODAY.

COMPARATIVE TESTS

PROVED *Reduced installation cost in sand.* A Griffin 100 wellpoint system installed in two days by three men, Westchester County Sewer Contract.

PROVED "INTERFLOW" *solves blocking of wellpoints* 180 Griffin Wellpoints worked successfully in BULLS-LIVER (fine sand and clay) on Federal Office Building foundations, in New York City.

PROVED Another contract *solves installation in gravel* problem. 80 JET 'N DRIVE wellpoints dry gravel and hard-pan subsoil Washington Sewage Treatment Plant.

PROVED *One equals two or more.* 75 JET 'N DRIVE WELLPOINTS on 5' centers replace 150 non-jetting wellpoints on 2'6" centers at Georgia dam.

PROVED North, South, East and West. We can refer you to leading contractors, experienced wellpoint users who have made a real profit on wet jobs due to the greater success and economy of Griffin Wellpoint Systems.

(Names furnished on request)

GRIFFIN WELLPOINT CORPORATION

60 EAST 42nd STREET, NEW YORK, N.

Light Mobile Mounting for Truck Crane

Lorain-30 truck cranes, formerly mounted only on trucks of 5-ton or heavier capacity, are now available for mounting on a Ford V-8 truck without loss of rated capacity, according to a recent announcement of the Universal Crane Co., Lorain, Ohio. The truck is a standard Ford V-8 in all particulars except that an auxiliary or third axle must be added, together with lengthening and reinforcing of the truck chassis frame as is usual in all cases when a third axle is added to permit the use of such a truck under heavy-duty service with loads of greater than rated capacity.

The crane turntable is a standard Lorain 30 turntable, full revolving, one-man operated, gasoline-powered unit, equipped with a 25-foot boom. With outriggers set, it has a lifting capacity at 10-foot radius of 13,050 pounds. Without outriggers set, its lifting capacity over the back at 10-foot radius is over 4 tons.

In order to preserve the all-weather cab on the truck and yet develop the low traveling clearances necessary on city streets, a special 25-foot boom has been developed for these units. This boom has a hinge connection at the center so the top section can be lowered and held in place by a couple of links, and thus provide the necessary low overhead clearance. For operation, the links are quickly removed and the boom is made into a rigid, straight column.

The truck is equipped with specially designed stabilizing jacks and stirrups which transfer crane loads directly onto the two rear axles for crane operation and eliminate all spring action, thus giving a rigid rear end. Jacks and stirrups are quickly released to permit normal rear spring action when the unit is in transit. They in no way encumber the rear wheels which are always free to turn so that the unit can be driven safely with loads suspended from the crane boom.

How the Other Fellow Did It

Ideas Which Have Already Proved Helpful to Contractors

An Ingenious Cable Reel for Shot-Firing

365 On a project in Wisconsin where the channel of the Milwaukee River was blasted to deepen it and prevent floods, an ingenious shot-firing cable reel was developed. The individual holes for blasting were connected in series, so that each group of series connections could be tested with a galvanometer before being connected in parallel to the firing line. A 500-foot duplex lead wire was used, wound for convenience on a portable reel. This reel resulted after various types of reels had been built and used on the project.

The wheels and axle were salvaged from an old buggy. The handles were made of ¾-inch pipe, while the reel proper was a discarded electric cable reel of suitable size. The reel holds 500 feet of rubber-covered No. 12 duplex cable, the inner end of which is permanently attached to a heavy-duty plug or outlet in the side of the reel. This makes it unnecessary to unreel the entire length of cable to connect with the end. Instead the operator may leave the reel wherever it is most convenient or best protected, and make connection by way of the outlet. One man readily moves the reel about and tends to the laying out and rewinding of the shot-firing cable. EE1.35.9.

Handy Device Cleans Dirt from Trail-Grader

366 Another southern contractor developed a handy device for the use of the men pulling out the dirt from the trail-grader behind the paver. It resembled in miniature a spreader plow such as is used in railroad work for making fills. It consisted of a plate which was bent to fit over the forms and then a wing that fitted snug to the forms and cleaned the dirt out so neatly that it could be readily shoveled up without digging into the grade with the flat shovels. This hand plow had a 3-foot handle of a bent ⅝-inch rod. 27.3.18

Novel Method of Trimming Bottom of Deep Trenches

367 On its sewer contract with the City of Columbus, Ohio, for the excavation of 2,790 feet of sewer trench and the laying of 2,790 feet of 30-inch concrete pipe in bad ground, Blanck & Gargaro Co., Inc., of Detroit, Mich., used a novel method of trimming the bottom of the trench. The sheeting was almost continuous and about 20 feet deep, making a large amount of bracing necessary. This seriously interfered with the work of a group of laborers whom it had been intended to use at the bottom of the trench after the Northwest pull shovel had completed the major excavation of the trench.

To overcome this difficulty the contractor resorted to the use of a fresno attached by a chain to the bucket of the pull shovel and by having only one man in the trench under the braces there was sufficient room to manipulate the fresno as it was pulled forward by the shovel and back again by the man. The material pulled forward was piled enough for the shovel to handle it readily. This handy and effective method of trimming the deep, heavily-braced trench was devised by Barney Massa, Superintendent for Blanck & Gargaro Co.

C. & E. M. Photo

Pulling the Hand Scoop Clear of the Sheeting

Greater Efficiency of Griffin Jet'N Drive Wellpoints made possible by new *wet vacuum type* centrifugal pump; expels air, yet pumps water at the same time.

THE WORTHINGTON SELF-PRIMING CENTRIFUGAL WELLPOINT PUMP

Here is a pump specially designed and built to permit the Griffin Jet'N Drive Wellpoints to operate at their maximum efficiency. Hydraulically correct in design, it pumps more water per gallon of gasoline and shows a greater air capacity than any other unit of its kind. It is self-priming. Its efficiency for dewatering jobs is unexcelled.

Sturdy construction, compact design plus the greatest possible simplicity assure long life to this unit.

Worthington Wellpoint Pumps are offered by the Griffin Wellpoint Corporation on either a rental or sale basis and are fully described in the catalog offered on the opposite page. Inquiries will be given careful study by competent engineers; practical construction men.

Wherever a heavy-duty jetting pump is required, the Worthington Two-Stage Centrifugal Pump will meet every requirement.

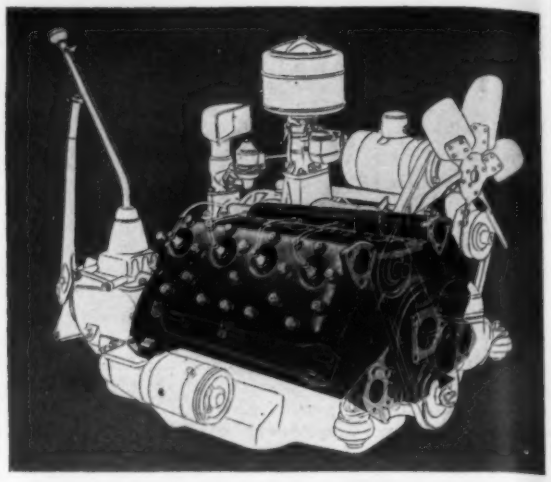
STUDY THESE IMPORTANT FEATURES

1. Simple and compact (weighs 2400 lbs.)
2. No water tanks, float chambers, pistons, valves, gears or belts.
3. More air and water per gallon of gas. Lower operating cost.
4. Hercules Engine, proved Hytor Primer.
5. Closed type impeller for increased efficiency.
6. Capacities up to 2000 G.P.M. with a 35-Hp. gasoline engine at 25-ft. head (15-ft. suction lift.) Larger sizes available.
7. Large capacity Wet Vacuum pump exhausts air up to 60 cubic feet per minute. Continuously removes and expels all entrained air.

WORTHINGTON PUMP AND MACHINERY CORPN.

HARRISON, NEW JERSEY

Here's One Reason Why BUILDING CONTRACTORS Are Changing to Fords



THE Ford V-8 engine is distinctly a quality product. It is designed and built to give reliable, economical service throughout its unusually long life.

But even this great engine will need overhauling SOME day. And when that day arrives . . . YOU won't have to foot a big repair bill or do without your truck for more than a few hours. Instead, after your original engine has given you thousands of miles of reliable, economical service, you can exchange it for a block-tested, factory-reconditioned engine . . . consisting of a complete cylinder assembly and heads . . . at a much lower cost than an ordinary engine overhaul and in much less time. Thus . . . from the very day you buy a Ford V-8 Truck or Commercial Car, you are sure of exceptionally low maintenance costs.

Ford alone . . . among the manufacturers of low-priced trucks . . . offers you this modern, economical low-cost engine exchange plan and the privilege of exchanging many other assemblies on this same basis.

MAKE YOUR OWN TEST OF V·8 PERFORMANCE AND V·8 ECONOMY RIGHT ON YOUR OWN JOB

These Ford exchange privileges are important, of course . . . from the view-point of low maintenance costs. But even more important are those features of Ford V-8 Trucks and Commercial Cars that make V-8 Performance and V-8 Economy the standards of the commercial field.

See for yourself what these features mean to you . . how much time and money they save you . . . by making an "ON-THE-JOB" TEST with your own loads, and comparing V-8 Performance and V-8 Economy with your present equipment. Then ask the DELIVERED price!

FORD V·8 TRUCKS AND COMMERCIAL CARS

New Cincinnati Office for Asphalt Institute

A new field office has been opened by The Asphalt Institute in the Enquirer Building, Cincinnati, Ohio, under the direction of Major Walter R. Macatee. Major Macatee brings to his new position a wide experience in highway construction extending over some 20 years and will be able to extend the cooperative engineering and research activities of The Asphalt Institute. The new district comprises Ohio, West Virginia, Kentucky, Indiana and southern Michigan.

McConnell Joins Patterson

W. M. McConnell has joined the Engineering Department of The Patterson Foundry & Machine Co., East Liverpool, Ohio, manufacturer of mixers and crushers, to take charge of the drafting room. Since graduating from Carnegie Institute of Technology, Mr. McConnell has had considerable experience in the handling of process equipment and plant design while connected with the Koppers Co. and the American Cyanamid & Chemical Corp.

Florida Road Contractors Must Be Licensed

Every contractor, person, firm or corporation, who offers or bids to construct within the State of Florida any public highway or project exceeding $50,000 in cost must obtain from the Comptroller an annual state-wide license at a cost of $1,000, in accordance with a law passed by the 1935 State Legislature. Before the State Road Department will receive proposals from contractors for road work, contractors must have obtained the license and, in submitting proposals, must advise the Department of the license number.

Sensation
OF THE ROAD BUILDING INDUSTRY

Never before such Strength, such Rigidity, such Visibility, and such a Wide Range of Blade Adjustments . . .

● Picture a grader that will cut a higher bank or a steeper bank than any grader you ever saw—one that will reach farther outside the wheels for shoulder cuts—one that permits extremely sharp blade positions and—a grader on which you can get the blade from a ditch cut to high bank-cutting position in *40 seconds.* That's the new-type Adams Leaning Wheel Grader that is being so enthusiastically received.

Its wide range of working positions is made possible by a new, box-type frame construction which also affords remarkable strength, rigidity, and visibility. Quick, positive and dependable power-operated controls literally make all adjustments a matter of seconds.

Available in 10 ft. and 12 ft. blade sizes, with or without scarifier and with power-operated or hand-operated controls. Send for descriptive folder and don't buy any grader until you inspect these remarkable new machines.

ROAD ADAMS MACHINERY

J. D. ADAMS COMPANY, Indianapolis, Indiana
Branches, Representatives and Distributors Throughout United States

—the New-Type ADAMS GRADERS

ABOVE: Having backsloped the bank, this twelve foot blade machine is cutting a narrow flat-bottom for the ditch. Note the sharp angularity of the blade. Note also the new, all-welded box-type frame and "T"-shaped drawbar. Extreme simplicity gives the operator a clear view of the blade at all times.

●

AT RIGHT: The blade can be adjusted from ditch-cutting position to high bank-cutting position *without any adjustment of lift links.* With power-operated controls an experienced operator can make this blade adjustment in approximately 40 seconds. Can you do this with your grader?

Curing Concrete Slab With an Asphalt Blend

The problem of curing concrete is one of providing conditions such that sufficient mixing water will be retained within the mass to supply the continued hydration demands of the cement in setting. Loss of water by evaporation from the exposed surfaces seriously affects the concrete for a depth of several inches. Sealing the new concrete with an impervious membrane is one method of assuring complete protection during the first 24 hours and continuing this protection until the slab is used.

Bituminous curing is not a new method and the Hunt process has been used successfully on Federal, State and municipal projects in all parts of the country. Hunt Process is a compound or blend of Bermudez asphalt and Gilsonite combined with a volatile solvent. It has a marked affinity for green concrete, adhering to the surface and forming a water-tight, and air-tight seal. It dries rapidly and forms a film of uniform texture, having great flexibility and toughness. With the hardening of the concrete, this film also hardens, becoming a part of the surface without penetrating.

This method eliminates the use of all moisture retentive materials. It requires no preliminary treatment. There is but one operation and the curing is completed. It prevents the evaporation of the mixing water, gives the concrete the benefit of this water at the most critical period, produces a concrete highly resistant to abrasion because of the strength of the surface which is cured as completely as the interior of the slab and the slate-grey color absorbs the carbon and crankcase oil stain.

Hunt Process is easily applied by one man with a single nozzle spray gun immediately after the concrete has been placed and finished. Complete information may be secured from the Johnson-March Corp., 52 Vanderbilt Ave., New York City.

You never can tell what a contractor will run into. While grading Pettigrew Street in Durham, N.C., Jim McGuire uncovered a deposit of very fine textured clay that was a Prussian blue and as pliable as rubber.

—The Road Machinery News

World's Largest Order for Coulee Concrete Plant

The Mason-Walsh-Atkinson-Kier Co., contractors for Grand Coulee Dam, 92 miles west of Spokane, Wash., on the Columbia River, have placed what is reported to be the world's largest order for concrete mixing equipment to be installed so that it can start concrete work on Grand Coulee Dam in September. Plans for handling the concrete call for such items as three 6,000-gallon per minute pumps, two 2,300-gallon per minute pumps, more than 3 miles of conveyor, a 16-inch pipe line, 3,000 feet long, and a screening and washing plant 5 stories high. There will also be a large crusher building, provisions for a 4,500,000-cubic yard waste pile, two large power shovels, and a water cleaning system.

It is reported that 25,000,000 gallons of water will be used each day for cleaning aggregates and for the concrete mix with 5,000 gallons per minute to be pumped through a 3,000-foot tunnel from the Columbia River.

Marlow Dealer in St. Louis

Marlow Pumps, Ridgewood, N. J., has announced the appointment of Joseph Kesl Tractor & Equipment Co., 1510 N. 13th St., Louis, Mo., as distributor for Marlow pumps in southern Illinois and eastern Missouri territory.

Machine Road Finishers

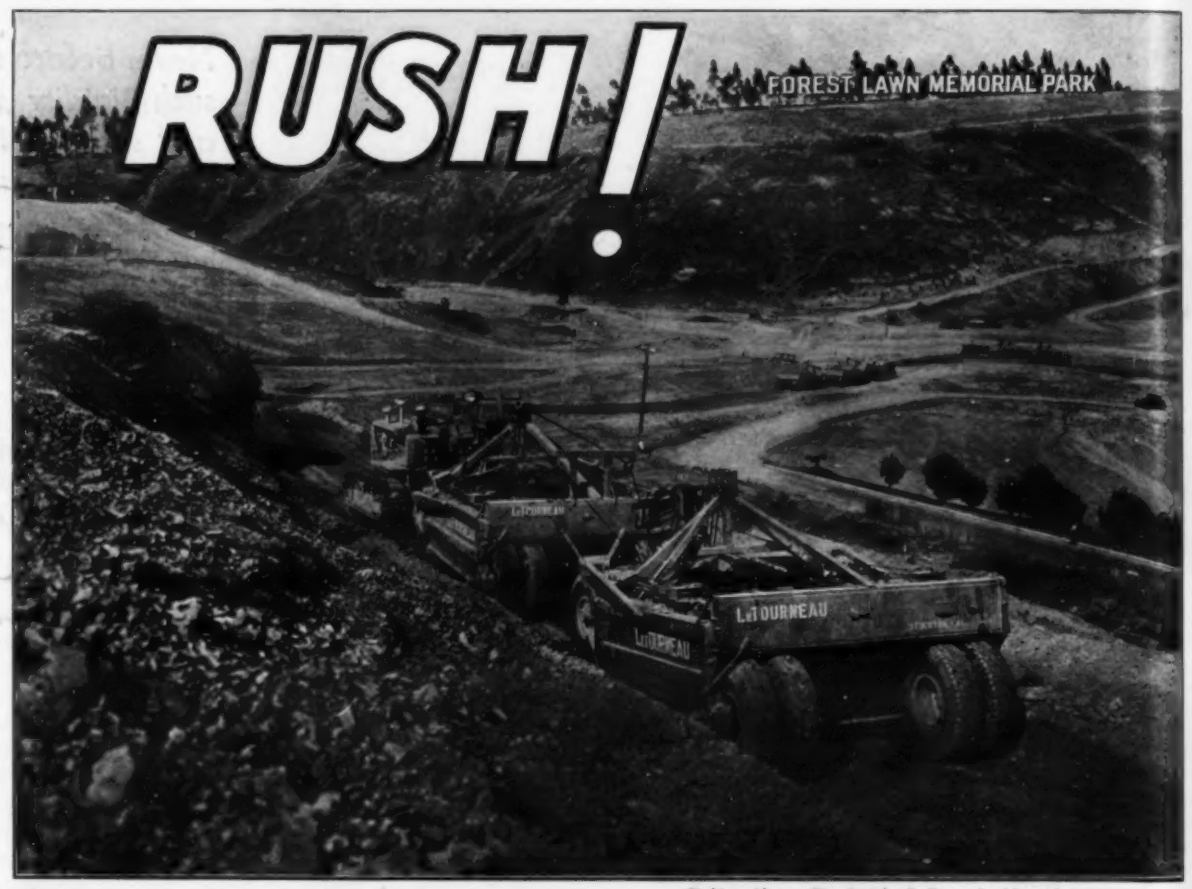
A 24-page bulletin, No. 1507, has recently been issued by Blaw-Knox Co., Pittsburgh, Pa., describing in detail Blaw-Knox road finishers of both the gas-electric and Ord types for concrete and asphalt paving. This bulletin also contains many pages of details of the various accessories for Blaw-Knox finishing machines.

20' Spread, ½" Chips
Backward or Forward

KOB Disc Spreader
patented 1929

Spreads sand, gravel, chips, shale, cinders, or chloride.
A smoother job with more coverage, and varying widths.
Fits any dump truck, large or small.
Write for further information

KOB MFG. CO.
329 E. Brown St., Milwaukee, Wis.



Picking Up a Big Load—Rolling double takes no more tractor power here, but yardage is increased nearly 60%.

A MILLION YARDS OF LANDSCAPING

At Forest Lawn Memorial Park, Glendale, California, a million yards of earth must be moved and placed in contour double quick. Lewis Construction Co., contractor, losing no time, has eight LeTourneau 12-yard Super Carryall Scrapers and a LeTourneau Rooter on the job. Of these eight Carryall Scrapers six are working as tandem rigs, and by so doing increasing the yardage per tractor hour 35 to 60%, cutting the yardage cost 25% and more.

Moving dirt at Forest Lawn Memorial Park is no snap—grades are steep, the material hard. Nevertheless LeTourneau Carryalls are moving such yardages as this:

70 Cu. Yds. per Tractor Hour

The longest haul is 1400 feet one way, with the return empty over a 14% upgrade. Here the LeTourneau Carryall tandem rigs are making a round trip every 14 minutes, placing 70 cubic yards per tractor hour—more than 1500 cubic yards per 22-hour working day.

Our Engineers are at Your Service—Ask them what you can expect LeTourneau Equipment to do on your job.

Contractor Designed Job Proved

When time is limited and big yardages must be moved, it's important to know what your equipment will do. With LeTourneau Equipment there is no "guesstimating," for LeTourneau Units were designed by a contractor to speed his own big contracts and have been proved on hundreds of jobs from Forest Lawn Memorial Park to Boston.

R. G. LeTOURNEAU, INC.
Peoria, Illinois Stockton, California

Cable address: "Bobletorno"
Manufacturers of: ANGLEDOZERS, BULLDOZERS, BUGGIES, CARRYALL SCRAPERS, ROOTERS, SHEEP'S FOOT ROLLERS, POWER CONTROL UNIT, DERRICKS

LeTOURNEAU

GOOD USED TRENCHERS

FOR PROFITABLE TRENCHING

In the heydays of the last real estate boom there was a big demand for dependable, general purpose trenching machines—we supplied a lot of them, but when the boom days ended as abruptly as they had expanded, many contractors were caught with new machines, but without jobs. We recognized the plight and took the best of them back in exchange for other products. Some units had operated only intermittently for sixty or ninety days. With the return of trenching work you can very profitably put one of these rebuilt machines on your operations. Pick one while prices are most attractive, and stock still complete. These sturdy machines measure up to modern designs in every respect. *Send for literature.*

HARNISCHFEGER CORPORATION
4419 W. National Ave., Milwaukee, Wis.

Well-Planned Details on Moran Job

(Continued from page 1)

platform. Before turning the first corner, the truck stopped and two men climbed onto the truck and coned out the batch as delivered by the batchers so that the cement would have a central cavity to fill and not tend to flow out over the side of the truck.

The cement platform extended a little more than the length between two freight car doors and was about 12 feet wide. There were two men in each car, equipped with goggles to keep the cement dust out of their eyes, shoveling to the General cement buggies which were wheeled out by one man from each car. Each cement buggy had been built up to carry its full load with plenty of freeboard and also had a hinged lip which swung into the chute when the buggy was tipped. Each buggy was weighed at the Fairbanks platform scales and the weight corrected from a wheelbarrow of cement handy to the scales.

There were two dumping traps for the bulk cement so that a 2-batch truck, of which there were a few in the fleet which varied from twenty to thirty trucks, only eight belonging to Moran, could drive forward to the second trap and save time, as there would be another batch of cement waiting there. The traps were counterbalanced so that they hung part way out from the platform. When a truck approached, the cement man would pull up the trap a bit to clear the head of the driver. Then when the buggy was run onto the trap it dropped onto the truck. The cement was delivered through the top sheet metal hopper into a canvas chute which rested directly on the aggregate. There was a minimum of scattering of cement dust in the dumping operation.

Well ahead of the final grading the batch trucks were turned on a Blaw-Knox turntable and backed to the paver.

Expansion and Contraction Joints and Steel

Expansion joints were set every 90 feet, using 1-inch premoulded material, and dummy joints every 30 feet with ⅜ x 2½-inch premoulded material. One man did nothing but make up and set the expansion joint headers or setting machines ahead. There were 16 dowels, 2 feet x ¾-inch, through each expansion joint and each dowel was greased and capped on the end away from the paver. The expansion joints were set with a U-shaped cap to hold them straight during pouring.

The slots for the contraction or dummy joints were cut by the longitudinal float men ahead of floating and the premoulded material set with a cap to keep it straight. The center longitudinal dummy joint slot was cut by the same men from a 2 x 12-inch plank, spanning the bridge used for the bullfloat. They cut and placed the premoulded material and then ran the longitudinal float over it, filling the voids caused by setting it. All contraction joints had sixteen dowels the same as the expansion joints.

C. & E. M. Photo

Placing Center Strip from a Plank Laid Across the Bullfloat Bridge

Pouring on Subgrade Paper

The skip of the Koehring 27E paver was equipped with an automatic pounder, consisting of a short length of chain holding a 2-foot section of rail. This swung forward whenever the skip was raised to its full height and then, swinging back, gave the skip a resounding thump that loosened all fine aggregate

(Continued on page 29)

YOU NEED THIS BOOK
ON THE NEW
40 VOLT
"SIMPLIFIED"
ARC WELDING
the many profitable uses of
"SIMPLIFIED" ARC WELDING
It's Free!
WRITE FOR IT
Learn how Simplified Arc Welding can cut your maintenance costs, keep equipment on the job without shut-down and do hundreds of jobs which you now think are impossible or turn over to outside sources.
Our booklet tells the complete story, ask for it.
HOBART BROS., Box CE85, Troy, Ohio

THE SHOW-DOWN
FEATURES NEW IDEAS
The contractor who is equipped with "Caterpillar" Diesel power makes his schedules, enters his bids, plans his work with assurance. For he knows that low fuel costs, low up-keep expense and dependable performance make schedules and profits safe. Your dealer can give you figures on the new power standards they have set up, and a SHOW-DOWN on what they can do for you.
CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL

WON'T QUIT
or cause time out

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company
32-36 Dey Street
New York, N.Y.

Hayward Buckets

Causeway Sections for Apalach. Bridge

(Continued from page 8)

Near the end of the fill the pipe line was divided to permit delivery to one side or the other of the embankment. Shut-off gates were inserted in each line to handle the flow as desired. The discharge of the line was delivered onto a plank mat to spread the flow as much as possible and then the flow down the slope was baffled to retain it insofar as possible within the 10:1 slope and direct it in the line of the embankment. Two Oxweld Acetylene carbic lights were used on the fill for the night shifts, supplemented by six Coleman gasoline lanterns which the men could take individually to any spot and have an intense light immediately available.

A Caterpillar Fifteen was used to snake the pipe on a sled and a Caterpillar Thirty with a Caterpillar 10-foot grader graded the fill to an accurate cross section.

In addition to the dredge Reliable, a couple of dories with outboard motors, and a few row boats, the contractor used a tug named Relief, equipped with a 60-hp diesel engine, for handling the barges and shifting the dredge when necessary. There were also a 700-barrel water barge, and a 700-barrel fuel barge for the dredge. The filling of the water barge for the dredge boilers was a simple matter as it was equipped with seacocks and when it was to be filled it was towed up the Apalachicola River beyond tide flow and the seacocks opened until it had filled to the required elevation and then they were shut and the barge towed back.

Just as ships crossing the Atlantic have certain gulls that are watched for year in and year out on approaching certain ports, the dump crew of the Reliable have a number of pet gulls that strut on the dump and take their pick of the cat fish that are cast up on the new shore. They have grown fat and lazy with the food so readily provided and may find life hard when the embankment is completed and they must make their attacks for food from the air.

Personnel

The contractor for the causeway embankment was Duval Engineering & Contracting Co., of Jacksonville, Fla., for whom E. A. Pynchon was Superintendent. E. S. Fraser was Project Engineer for the State Road Department of Florida and W. S. Gudgell was Resident Engineer-Inspector for the Public Works Administration, Project 843.

C. & E. M. Photo

The Delivery End of the Dredge Pipe Line Showing the Plank Mat Used to Spread the Flow

Trailer Patrol Grader Has Front Hand Control

By placing the hand controls of a trailer patrol forward on the pole, Caterpillar Tractor Co., Peoria, Ill., has converted its trailer patrol into a one-man maintenance machine which can be used behind any make of tractor. The position of the single handwheel, which controls both ends of the blade by means of a shift lever, can be adjusted to be within easy reach of the operator. Further, the handwheel can be raised or lowered to the desired height by changing the setting of the links that extend upward from the pole bracket to support the control box.

Complete information on the design of the Caterpillar patrol grader is found in Circular 1660 and details of the front control in Circulars 2855 and 2856.

MECHANICAL MARKING MACHINE

for STREETS, HIGHWAYS, TENNIS COURTS, FACTORY FLOORS, etc.

Will produce a clean cut line, 3 to 6 inches in width, with total cost less than .005c pr. ft. Easily handled and controlled to meet the ordinary or the special marking conditions.

Write for Booklet G illustrating our line of paint spray equipment

SIMONS PAINT SPRAY BRUSH CO.
Dayton, Ohio

The Digging Demon

The Williams "Champion" Power-Arm Bucket is FASTER ACTING because of shorter cable overhaul—and is SUPER-POWERFUL because of its exclusive power-arm combination of lever and block-and-tackle. *Write for Bulletin.*

THE WELLMAN ENGINEERING CO.
7012 Central Ave., Cleveland, Ohio

WILLIAMS BUCKETS

For every industrial use

Waukesha XAHU Power Unit, 25 hp. to 35 hp., operating 6-in. Sterling self-priming pump, pumping irrigation water near Sheridan, Wyoming.

Waukesha FSU Power Unit, 12½ hp. to 20 hp., operating MFS Sterling self-priming pump, and Waukesha FKU Power Unit, 20 hp. to 30 hp., operating MFK Sterling self-priming pump, dewatering coffer dam on highway bridge construction job, Dodge City, Kansas.

Model VKU 32½-45 hp. Contractors' Power Unit.

WAUKESHA ENGINES

■ Waukesha Engines are the product of years of continuous refinement and embody the experience of hundreds of thousands of owners throughout the world.

The husky crankshaft of the VKU engine has large 2¼-inch main journals and very heavy cheeks and crank pins. The integrally cast cylinder and crankcase construction effects a stiffness and rigidity that insures smooth, steady operation and low up-keep. Full pressure lubrication by submerged oil pump feeds all bearings, shafts and gears within the engine. By careful study, baffles, ports and passages of the cooling system are located so that neither over-heating nor over-cooling is possible. The Waukesha built-in governor provides close regulation without hunting.

Write for Bulletin 827. *Waukesha Motor Company, Waukesha, Wis.*

Largest All-Welded Bridge Completed in New Jersey

(Photo on page 36)

Probably the largest truss bridge ever built in the United States by welding and probably one of the two largest all-welded truss bridges in the world was recently completed across the Rancocas River, connecting Riverside and Delanco, N. J., and will soon be opened for traffic. Erected by the Shield-Arc process of electric welding, 450 tons of structural steel were fused into one continuous structure at a saving of 10 to 15 per cent in weight.

Built at a cost of $252,500, the Riverside-Delanco Bridge is 397 feet long with a roadway 36 feet wide between curbs and one sidewalk 5 feet in width from the center line of the bridge truss to the center line of the hand-rail. The width of the bridge, measured from center to center of trusses, is 38 feet 6 inches. It is supported on five piers, two abutments, two intermediate and one center pier.

The steel frame of the bridge is made up of three spans, two of which are approach fixed spans and one swing span. The two fixed spans each measure 112 feet 8 inches center to center between end bearings with two spaces 4 feet 6 inches long over the piers. The swing span is 160 feet long center to center between end bearings. These spans, totaling 385 feet 4 inches in length, added to 9 feet for the two spaces over the piers and two spaces, totaling 2 feet 8 inches between the center line of the end bearings and back wall, make the total length of the bridge 397 feet.

Each truss of the two approach spans was fabricated as a complete truss member in the shop by arc welding before shipment to the job. Shop welding was also used in fabricating the trusses of the swinging span which were welded in three sections. These were later welded in the field into one truss for the center span.

A total of 16,000 linear feet of welding was required in fabricating and erecting the structural steel, of which 15,000 feet of 5/16-inch full fillet welds were required in the shop fabrication, all of which was done by the American Bridge Co., at Ambridge, Pa. The field welding was done by the J. K. Welding Co., of New York. All welding was done with Lincoln equipment and electrodes.

The contract for the Riverside-Delanco Bridge was let January 29, 1934 to the Kolyn Construction Co., of Trenton, N. J. The contract for the superstructure was sublet to the American Bridge Co. and the contract for the welding sublet to the J. K. Welding Co. The Bridgeweld Engineering Co., of New York, acted as construction engineers for the project, with H. B. Mish as their field representative.

CONCRETE VIBRATORS

Air operated vibrators for all classes of concrete construction including Bridge deck slabs, Dams and Locks, Highway pavement and Concrete products.

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Tons of Chemical Lays Dust On Minnesota Roads

Nearly 500 tons of calcium chloride has been distributed among the various maintenance districts of the Minnesota Highway Department this summer for dust laying in towns and villages.

Where graveled trunk highways run through built-up sections of communities, it is the policy of the department to prevent the dust nuisance which often develops if some kind of surface treatment is not provided. Many of the gravel routes have bituminous surfaces or pavements through towns, but where this is not the case, calcium chloride is used.

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Self-Priming PUMPS

The choice of contractors from coast to coast

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GMC DUAL PERFORMANCE Assures greater gas mileage . . . less wear on engine . . . more work, more profits.

Here, to be sure, is one of the few major truck refinements of the past ten years—one that shrewd operators by the hundreds have been quick to earmark as *the feature of 1935 truck design.*

Think of getting as much as 28% greater gas mileage, of being assured of as much as 22% less wear on engine and other driving units. And in addition to effecting such important savings in operating and upkeep costs, the GMC Dual Performance Axle likewise saves time and money by enabling the truck to climb steeper grades faster, travel faster on the level and handle bigger loads.

Get the facts about this revolutionary GMC feature now available in the 1½-2 ton as well as 2-3 ton range. And get the facts, too, about the other 47 money-saving features of the GMC 1½-2 ton truck of value.

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"This particular unit is better adapted to our work than anything we have ever used."
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"We are sure this type of rear axle is the most satisfactory unit for heavy duty work at a minimum cost of operation."
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1½-22 TONS

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Results of Vibrating Concrete in Illinois

(Continued from page 6)

crete obtained would be at least as good as that obtained by hand methods. That the consolidation obtained was better could be seen both by observation of the placing of the concrete and from the final appearance.

Tightness of forms is much more important than when hand methods are used. Any opening will cause leakage of mortar from around the coarse aggregate, resulting in a small area of honey-combed concrete at that point. Small air bubbles between the form and the mass of concrete which mar the appearance somewhat seem to be a natural consequence of this method of placing, but these have not presented any particular problem. A large percentage of these may be removed easily on exposed surfaces by rubbing.

Vibrating Pavements

Vibratory methods of placing concrete pavements have not received the universal acceptance accorded the internal vibration employed for structures. Since a pavement is relatively thin, internal vibration is rather impractical except where it may be used to advantage in consolidating the concrete at localized points, such as at expansion and contraction joints, adjacent to the longitudinal joint, and along the forms. The vibratory units are generally placed on top of the screeds, imparting to these the properties of both screeding and vibrating simultaneously.

Although development of other types of vibrating units has been reported, the vibration used in placing concrete pavement up to the present time must in general be classed as external vibration, it being applied to the surface of the mass and not to its interior.

Studying External Vibration

The advantages which result from external vibration in placing concrete pavement are well known. Since drier consistencies may be used, either the water-cement ratio may be decreased, resulting in higher strength concrete; or the amounts of aggregate may be increased, resulting in a saving of cement; or a middle course, that of decreasing the water-cement ratio and increasing the amounts of aggregates simultaneously but to lesser degrees, may be followed, resulting in both increased strength and a saving of cement.

Illinois undertook an investigation during August, 1932, which included the construction of about one mile of pavement, consisting of 114 individual sections and nearly as many different mixtures, duplications being made in a few instances. Both gravel and crushed stone coarse aggregates were used. The finishing machine was essentially a standard type with the screeds designed in a slightly different manner. Three vibratory units, which operated at about 3,600 impulses per minute, were placed on the front screed and two on the rear screed.

The design of the mixtures was varied to show not only the most suitable proportions but also the limitations of the equipment. The quantities of aggregates per bag of cement were varied approximately from 180 to 265 pounds of sand; from 320 to 510 pounds of crushed stone; and from 360 to 540 pounds of gravel, the larger quantities of sand in general corresponding to the larger quantities of coarse aggregate. The cement content was varied approximately from 1.1 to 1.5 barrels per cubic yard of concrete. The amount of mixing water for standard strength was in the vicinity of 5.33 gallons per bag of cement, but had to be increased for several of the harsher mixtures in order to place them satisfactorily.

Results

It was found that standard strength was in general obtained where the mixing water was not increased above the specified amount, and that satisfactory consolidation of the concrete was obtained in all instances. The most suitable mixtures were of about ½-inch slump and contained a ratio of sand to total quantities of aggregates of 32 to 35 per cent. A reduction of about 15 per cent from the amount of cement used with ordinary equipment was obtained without sacrifice in the quality of the concrete.

Favorable results have been obtained from similar investigations by others, and while this method of placing concrete pavement has not been accepted widely, this can not be attributed to the fact that the benefits which can be derived from it are unknown. It is rather that some uncertainties still exist which warrant further preliminary work.

With the information already at hand, relative to the placing of concrete mixtures by means of vibration, for use as a basis for further investigation, it is to be expected that many improvements both in equipment and methods will follow shortly. It is also safe to predict that vibration will be the chief means of compacting concrete in the near future.

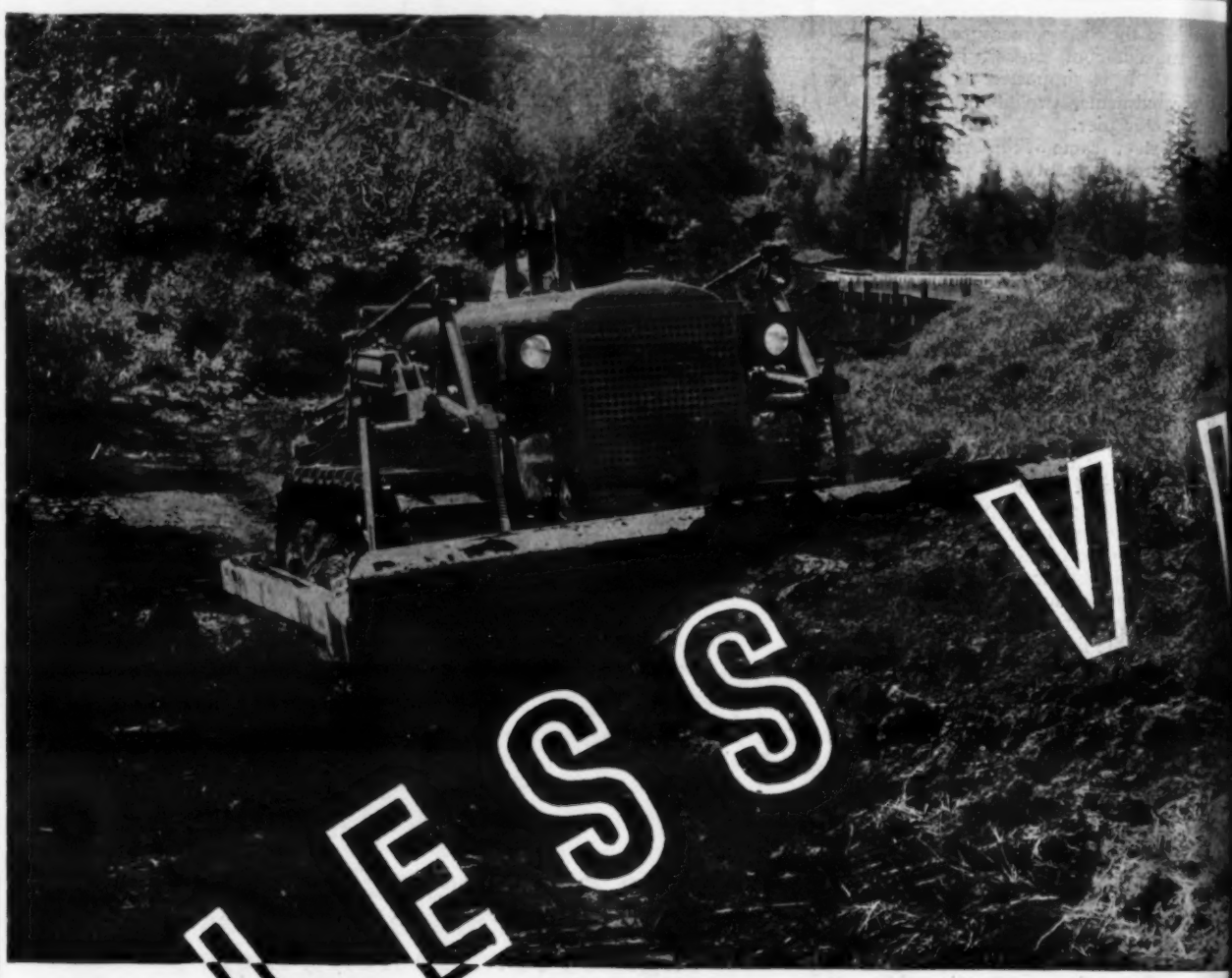
From a paper presented at the Twenty-first Annual Purdue Road School.

Chadwick Machinery Co. Handles Link-Belt Shovels

The Chadwick Machinery Co., of Milwaukee, Wis., has been appointed distributor of Link-Belt crawler shovels, cranes, draglines and locomotive type cranes. The Chadwick organization has been serving the contracting trade since 1920.

Lehman of Blaw-Knox Dies in Pittsburgh

Albert Carl Lehman, Chairman of the Board and founder of the original unit of the Blaw-Knox Co., died on July 24 in Pittsburgh in his 57th year. Mr. Lehman had not been active in business because of ill health for the past nine months but has been prominent in the steel industry as head of the Blaw-Knox Co. which he was largely instrumental in building from a small manufacturing unit to one of the leading independent fabricators of steel specialties. He organized the Blaw Collapsible Steel Centering Co. in 1906, served first as Vice President and later as President, continuing in this capacity until recently when he was elected as Chairman of the Board. He was a director of the Blaw-Knox Co. and of twelve subsidiary and affiliated firms.



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"SHE purrs along like a gasoline engine." That's the way an operator describes the smooth flow of power which puts Allis-Chalmers Oil Tractors in a class by themselves. Yet ... the A-C Oil Tractor operates on any low cost fuel that can be used successfully in a Diesel engine.

Why this unusual smoothness? Because the Allis-Chalmers Oil Engine is not compelled to labor against high compression pressures ... internal pressures are only one-fourth to one-third those of the unimproved type. Crankshaft "whip" is greatly reduced ... the flow of power through clutch, gears, shafts, etc., is far smoother. There is less strain on working parts, less vibration, fewer repairs. Power is more responsive ... the Oil Tractor "gets there" faster ... delivers more dirt to the dump ... at lower cost per yard.

Get the FACTS about this new, improved system of engine operation ... Diesel fuel is injected with a Diesel pump and ignited with a spark. Here is one big reason why A-C Oil Tractors do the work at Lowest Final Cost.

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, U. S. A.

Picks and Shovels

(Continued from page 1)

that "road enthusiasm is high but funds are lacking," according to an interview with George Curtis Peck, director of the Inter-American Highway office in Panama, in the Panama *Star and Herald*. Mr. Peck who with E. W. James, Chief Engineer for the highway, recently completed a tour of Central America in the interest of the proposed highway, reported interest and enthusiasm in the project, and a realization on the part of Central American officials of the economic and social benefits of the highway, but who is to furnish the funds?

Business has not been so bright in these countries to make possible the expenditure of the millions necessary to complete such a project. There also seems to be an increasing reluctance on the part of the Central American states to become further indebted to the United States, even if this country could afford to pour in the necessary capital. While the automobile group in this country, which would be considerably benefited by the road, might supply the money, the local Central American governments look, with justifiable disfavor, on the idea of outside interests having a direct hand in their road communications.

More than interest and enthusiasm are necessary to the completion of the Inter-American Highway, and until some practical plan of financing the project is arrived at, this vast undertaking seems to recede again into the haze of the future and take on once more its original aspects of a dream.

"A good way to relieve the monotony of any job is to think up ways of improving it."

N. Y. State Departments Buy 110 Trucks and Cars

The Public Works and Conservation Departments of the State of New York have recently accepted delivery of fleets of Ford V-8 commercial cars and trucks. The largest single order was for 75 stake-body trucks of 1½-ton capacity with 157-inch wheelbase. Fifteen of these units, painted battleship gray, are to be used by the Division of Highways in the Public Works Department.

Next in size was an order for ten trucks and seven commercial cars for use by the Lands, Forests, Fish and Game Divisions of the Conservation Department. Various other state departments took the remainder of the 110 deliveries from the Green Island, N. Y. branch of the Ford Motor Co.

"I'll say it's easier to start," says the operator, "and we don't have to warm up the engine to burn Diesel fuel."

"Smoother operation and less vibration mean a lot to us. The 'L-O' Oil Tractor goes where we want it ... right now."

"Simplicity of the Oil Tractor engine makes a hit with us. We don't need a service man around to keep it running."

Okeechobee Levee Now 60 Miles Long

Already 60 miles of levee have been built, four hurricane gates installed in the completed section of levee, floodway channels are underway and work on the navigation channel is progressing rapidly at Lake Okeechobee, Florida. An average of more than 1,000 men a month has been maintained at the site working on this $7,700,000 PWA project to regulate the waters of the treacherous fresh-water lake.

The levee is being built to a height of 34 feet or 4½ feet higher than the maximum known crest of the 1928 flood which took a toll of approximately 2,000 lives. Through a system of canals, cutting through the levees, the water can be run off the lake into the three adjoining rivers and their tributaries in flood time, and it can also be stored during low-water seasons for irrigating the Everglades region when that area has been drained of its swamp water.

Tropical storms, with rainfalls up to 20 inches in 24 hours, are common in this area. Lake Okeechobee, covering some 730 square miles, is an open prey for these catastrophes. To provide additional means for controlling the level of the lake, the channel of the Caloosahatchee River, flowing from the lake to the Gulf of Mexico, is being improved to carry off some of the excess waters. The entire control project, at a total cost of $17,000,000, will probably be completed in 1937.

Buffalo, N. Y., Dealer Holds Road Show

On July 16-19, Dow & Co., Inc., of Buffalo, N. Y., distributor of equipment for highways, held its first annual Road Show. The site of the Show was that of a proposed playground, with a large hill to be leveled off and a low area to be brought up to grade, offering an excellent opportunity for a demonstration of the equipment on display.

Mowing machines and motor scythes were used to cut the weeds, and a Lorain 40 shovel and a Continental wagon scraper pulled by a McCormick-Deering diesel 40 tractor were used to excavate the dirt. Three trucks hauled the dirt from the shovel while the wagon scraper dug and hauled its own load. A Continental Trailbuilder mounted on a McCormick-Deering TA-40 tractor, a Continental Trail builder mounted on a McCormick-Deering TD-40 tractor and an Adams Model 301 motor grader leveled the dirt. About 3,000 yards of dirt were moved during the Show.

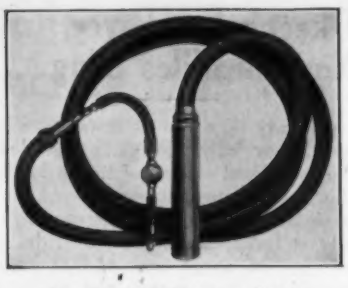
Practically all of the equipment on exhibition was in operation. The Barco Mfg. Co. laid a small stretch of concrete pavement 18 inches thick of high-early-strength concrete two weeks previous to the Show. This was broken up by Barco gasoline pavement breakers during the course of the Show.

A 5-kw portable generating plant, made by the Ready-Power Co., was used to furnish power for the talking pictures which were run continually in one corner of the big exhibit tent which housed the equipment.

The following companies had equipment on exhibit:

International Harvester Co.; Thew Shovel Co.; C. H. & E. Mfg. Co.; Gravely Motor Plow Co.; Wellman Engineering Co.; Continental Roll & Steel Foundry Co.; Mohawk Asphalt Heater Co.; Frank G. Hough Co.; Detroit Harvester Co.; Western Cataphote Co.; Williamsport Wire Rope Co.; J. D. Adams Co.; T. L. Smith Co.; Barco Mfg. Co.; Chicago Pneumatic Tool Co.; Burch Corp.; Metal Forms Corp.; Ready-Power Co.; Illinois Wire & Mfg. Co.; Empire State Culvert Corp.

About 900 visitors attended the Show.



The New CP Shimmy Spade

Shimmy Spade Vibrates New Concrete in Forms

An air-powered vibrator for concrete placement and called the CP Shimmy Spade has been announced by the Chicago Pneumatic Tool Co., 6 E. 44th St., New York City. It is a compact watertight unit with a Power Vane air motor directly attached to the rotary eccentric, thus eliminating the flexible shaft employed in similar tools. It is high speed, has few moving parts, is easily handled and the air consumption is reported as low.

The unit which will care for the output of a 2-bag mixer, weighs 46 pounds and consumes 25 cfm of air at 90 pounds pressure. The similar unit for the output of a 5-bag mixer weighs 56 pounds and requires 40 cfm of air per minute. The standard equipment includes 20 feet of flexible hose, a line oiler and hand throttle.

New Backfill Scraper Board

A new type of backfill scraper board, which is different from the conventional type scraper in that it is constructed heavier and more rigid, so that it will take hold in the hardest materials, has been announced by the Newo Hoist Co., 17309 Fernway Road, Cleveland, Ohio.

There is no chain bridle on the front of the scraper or other parts to catch on obstructions such as trees or poles. Also there are no side bars or braces to prevent the cutting edge from entering the material. Quick change to other equipment is made possible by the use of rope sockets and there are sizes to fit all makes of cranes.

These scrapers are built to fit all cranes with boards 3 to 12 feet wide, and special sizes to meet specifications are available.

New Catalog on Buckets

A new catalog describing and illustrating Industrial Brownhoist utility and heavy-duty clamshell, power-arm and lever-arm clamshell, power reeve excavating and link-type grab buckets, made in a variety of sizes to meet the requirements of material handling, has recently been published.

Copies of this new Catalog No. 353 may be secured free upon request from the Industrial Brownhoist Corp., Bay City, Mich.

New Fast Dirt Mover Made by Allis-Chalmers

The growing demand among dirt movers for high-speed hauling equipment mounted on low pressure pneumatic tires has led to the development of a dirt hauling unit now ready for distribution by the Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis. This machine, known as the Speedster, because of its ability to haul 6 to 8-yard loads at speeds ranging up to 16 miles an hour, consists of a trailer-type wagon and tractor with six big low-pressure tires. The drive wheels of the tractor carry a part of the load weight, assuring ample traction under all conditions.

The 18-inch by 60-inch tires have shown their ability to carry heavy loads through soft, uneven ground on grades and at the same time permit high speeds to and from the dump.

The new cushioned hitch provides stability without sacrificing flexibility. It consists of a complete universal joint stabilized with two large rubber cushions to prevent side sway. A special low hitch, below and ahead of the drive axle center, prevents "rearing" of the tractor. High clearance eliminates the possibility of "hanging up" on the dump.

The Speedster can turn at greater than 90-degree angles, the high arch providing clearance for the tractor to undercut, and to turn in its own tracks for quick, accurate spotting under the dipper or grader. Steering is assisted by independent clutches and brakes.

One man operates the entire unit; braking, dumping and winding operations are vacuum controlled from the tractor dashboard. The all-welded design provides strength with minimum weight and the torsional tube main frame resists twisting strains from the body. A wide, unobstructed bottom-dumping mouth discharges the loads instantly. The open hopper top has a reversible side for low loading operations when needed. Anti-friction bearings are used throughout.

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The Fulton line is sold through Contractor Supply Dealers in every state. A quality line priced right. Ask for SHUREDRY and FULTEX Tarpaulins, Tents, Windbreaks.
Write our nearest plant today for catalog, samples and price list.

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ATLANTA ST. LOUIS DALLAS
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Easy pickings for an American Gopher 1¼ Yd. Shovel. Dipper manganese construction, renewable and reversible tooth points, rake of dipper easily adjusted.

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Manufacturers of
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—Gardner-Denver Has Them All!

Fully adjustable, tilting mast . . . ability to move wheels to 90° angle with vertical adjustment for rough bottom or side-hill drilling . . .

Exceptional hole-cleaning ability—when a hole is drilled, it's clean . . .

Absolute, positive control of drill by operator, due to use of pneumatic cylinder instead of hoist . . .

Feeding pressure adjustable to fit your drilling needs . . .

Use Gardner-Denver Wagon Drills for your deep down-holes, your heavy rock cuts. You'll get more than twice the daily footage that you could get with hand-held drills—and use far less steel and hose.

Remember, too, that with wagon drills you can drill more closely spaced holes, assuring better powder distribution and eliminating secondary shooting.

But be sure you get GARDNER-DENVER Wagon Drills. For today Gardner-Denver offers you advantages obtainable nowhere else . . . exclusive features of design that fit YOUR job better.

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MAKES AIR DO MORE AND COST LESS

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TOWER TYPE
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HOT OR COLD MIX
Accurate control of materials to comply with any standard specifications for bituminous mixtures.
Send for Bulletin T-248
HETHERINGTON AND BERNER INC
Indianapolis, Indiana

Tabby Stands Test of Time

(Continued from page 2)

all times from the walls, to prevent the Indians from scaling it. The wall is about 2½ feet thick and the unburnt oyster shell is very prominent throughout.

There is also preserved by the City of Charleston, S. C., a section of the old city wall which was the north boundary of the city and which looks as if it were built of the same material as the wall at Dorchester.

Tabby on St. Simons Island

On Saint Simons Island, off the coast of Georgia and about 10 miles from Brunswick, Ga., is located Fort Frederica, built by General Oglethorpe to command the channel which was used by the Spanish settlers as their means of communication north and south. In the remains of this fort, constructed of tabby, the oyster shells are very apparent. In addition, on the same island in the reputed haunted churchyard where stands the huge tree under which John Wesley and his brother Charles preached, there stands the remains of a tomb built of tabby.

Also on Saint Simons Island, the walls of the main building of the Country Club are of tabby, this being a rebuilt structure which was originally a plantation storehouse. On the coastal highway, U. S. Route 1, several miles north of Brunswick, there is an old mission of this type of construction which is visited by thousands of travelers each year.

Acknowledgments

We are indebted to Lee S. Trainor, Chief Engineer, Construction Division, National Lime Association; to H. M. Lydenberg, Assistant Director, New York Public Library, and to Gadsden Smith of Charleston, S. C., for their cooperation in adding to the information gathered personally by the Editor in Georgia to produce this article on a historical construction material.

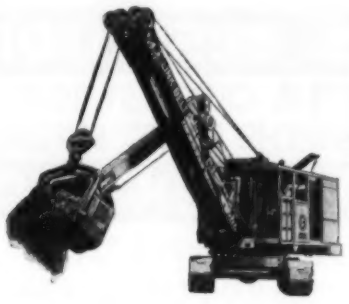
New Ideas in Finishers

Some of the older concrete finishers could not keep up with the speedy modern paver and for a time it was customary to use two finishing machines on any job turning out more than an average amount of pavement a day. That is no longer necessary for the modern finisher has been speeded up until it can finish the concrete produced by the fastest paver, the Portland Cement Association has pointed out.

The gas-electric type of drive is one of the most recent improvements. Electricity is generated by a gasoline engine and each of the units on the finishing machine is powered with its own electric motor. This results in smoother starting and easier operation. It also provides power for night lighting and for the electric type of vibrators if those are to be used.

A template that strikes off the concrete at the elevation for the reinforcement is also a part of the modern finisher. Some finishing machines make it possible to finish wide curves without setting additional forms. Some also have adjustable templates that can be readily changed by the operator to eliminate crown on curves. In this connection, it might be added that the tendency nowadays is to carry the crown through the curve, regardless of superelevation.

At least one finishing machine provides for both backward and forward screeding. This makes it possible to carry concrete back with the template, to fill slight depressions, and it also speeds up the finishing operation. Backward screeding is reported especially advantageous on grades where superior concrete is supposed to be secured by working the finishing machine upgrade.



"Ask Around"

Perfected engineering . . . smooth coordination . . . good all the way through . . . a masterpiece for performance from the ground up . . . so reads the Link-Belt reputation, proven on the hard battlefield of many a tough job. For heavy duty? Will it "stand the gaff"? Just ask around . . . you'll hear again and again the Link-Belt reputation.

STABILITY
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From ¾ to 3 yards capacity, heavy-duty built. Gas engine, Diesel, or electric motor drive. All models can be shipped loaded on a flat car without dismantling.

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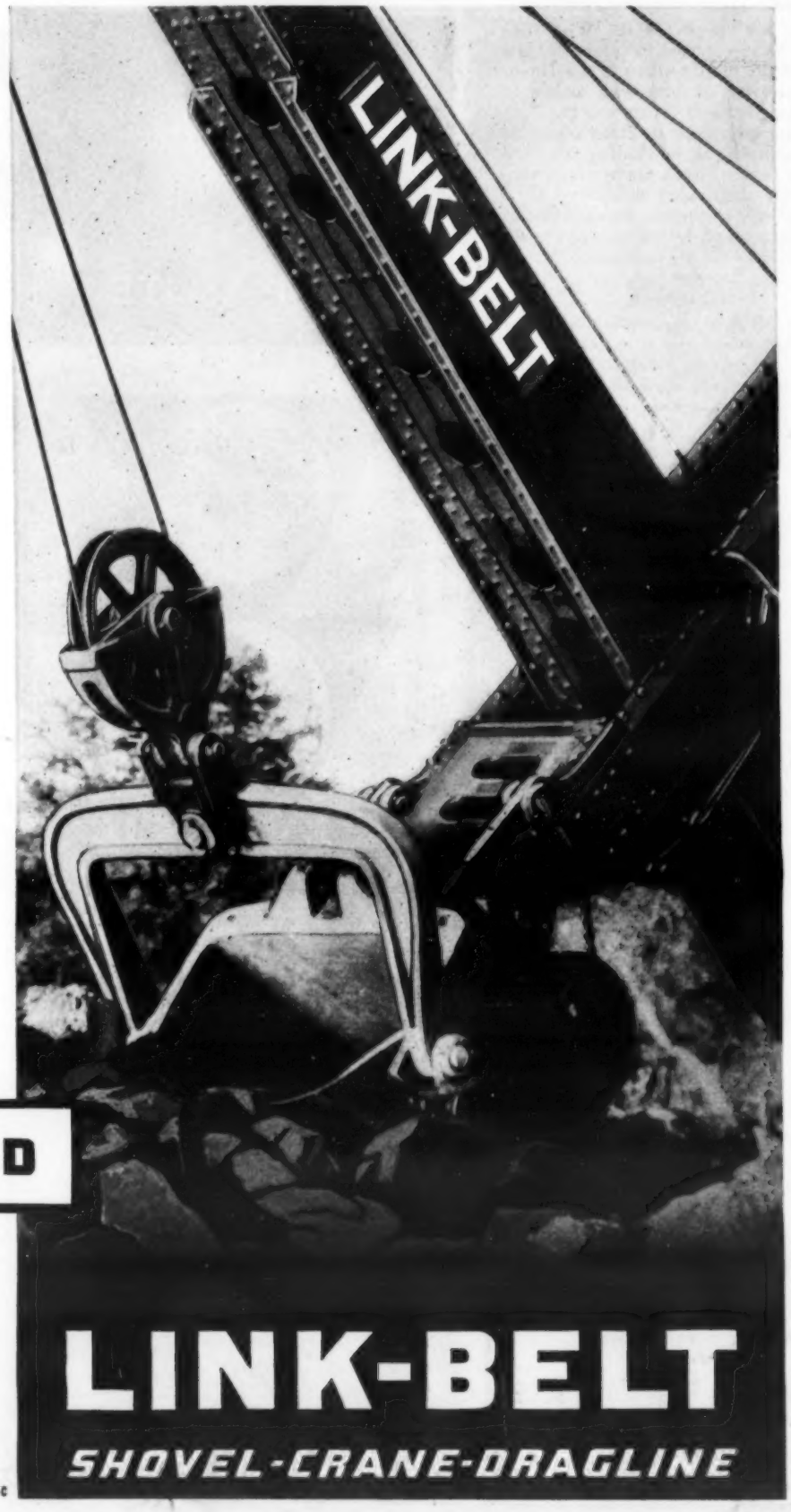


LINK-BELT
SHOVEL-CRANE-DRAGLINE

Lubrication Queries

Is some lubrication problem bothering you? Tell us about it and we shall be glad to help you.

Question

We don't want to use inferior lubricants in our machines but how can we be sure that we are getting good quality in the oil we buy?—Chicago, Ill.

Answer

You have stated a very real problem because there is no way for a layman to judge the quality of the oil. Consequently he must rely upon the reputation of the oil distributor from whom he buys his lubricants.

You have doubtless heard the old Arabian story which goes like this.

"Tell me, O Wise One, what shall I do to receive the most for that which I spend?"

"My son" answered the Wise One, "the priceless ingredient of every product in the market place is the Honor and Integrity of him who makes it. Consider his name before you buy."

Fortunately, there are many reputable manufacturers of lubricating oils and greases in the United States whose products are distributed over very large sections of the country. Be sure first of the reputation of the refiner and second, the reputation of the distributor.

Question

Does oil wear out, rather than just get dirty? What I have in mind is that it does not seem necessary to drain and flush out the crankcase of our tractors and power graders every time the oil gets a little low.—Mamaroneck, N.Y.

Answer

Yes, oil does wear out. Its whole molecular structure is broken down by heat and it loses its lubricating properties. Non-technically we may consider the molecules of lubricating oil as new perfect marbles which when heated chip and break up so that they do not roll around on each other readily. The crankcases of the engines of your tractors and power graders should be drained every 60 hours of operation and clean oil, of good quality and proper consistency, as recommended by the manufacturer of the engine, put in.

Mixing new high-grade oil with dirty oil merely continues the time during which the dirt and grit in the old oil may get in its destructive work on the bearings and cylinder walls of the engine. A little dirt mixed with the best grade of oil makes it much worse than a poor grade of oil that is perfectly clean. The dirt is especially harmful in any assembly where ball bearings are used. The dirt problem is especially bad on tractors working in extremely dusty or muddy conditions.

Electric or Belt Drive. 2 H.P. Gasoline Engine can be used on Belt Drive.

PRICE $175

Resharpen Your Rock Bits

with a Quick-Way Bit Grinder.

Resharpen them again and again at a cost of from 2c to 4c per bit.

C. H. CARLSON MFG. CO.
13-15 Main St. N. E. Minneapolis, Minn.

Collisions Increasing On Unlighted County Roads

For fifteen months the five principal parkways which carry a heavy volume of traffic avoiding business districts in Westchester County, N. Y., have been in complete darkness "during which time thousands of overtaxed motorists have risked their necks and shattered their nervous systems driving on these unilluminated roads," reports the *Review* of the Automobile Club of New York. During the first six months of this "reign of darkness" a 31 per cent increase in auto accidents was recorded on the Saw Mill River and Hutchinson River Parkways alone, based on statistics furnished by Herman W. Merkel, General Superintendent of the Westchester County Park Commission. These reports include only those collisions and accidents occurring between the hours of 9 P.M. and 5 A.M.

That the county authorities should act without further delay is borne out by the complete 1934 figures which show a 10 per cent increase over 1933 in automobile collisions on the dark parkways.

These figures show the burden which is placed upon the automobilist through the failure of a county authority to light its highways adequately. In this particular case, it was a question of saving money through the extinguishing of existing lights. Many counties throughout the United States are now suffering thousands of automobile accidents each year through failure to appreciate the increased safety of motoring at night through highway lighting.

Road construction programs carried on by State Highway Departments are based on policies which do not require apologies to future generations of tax payers. —*American Highways*

SAUERMAN
LONG RANGE MACHINES

Powerful, economical machines are these Sauerman Drag Scrapers and Slackline Excavators. They will span an area 1,000 ft. or more in width and move materials from any point in this area at a rapid rate. There is a special type of Sauerman machine for underwater excavation, another for digging from a bank, another for cut-and-fill work, and so on.

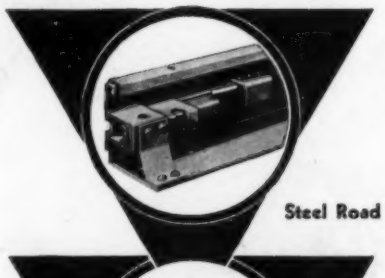
Write for 56-page Catalog

SAUERMAN BROS., 464 S. Clinton St., CHICAGO

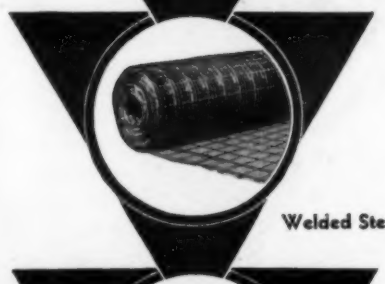
BERM-A-LITE

THE BEST JOB
IN THE QUICKEST TIME
AT THE LEAST EXPENSE
A PERMANENT JOB
THAT REQUIRES THE
MINIMUM OF UPKEEP—

That's Trusconomy!



Steel Road Forms



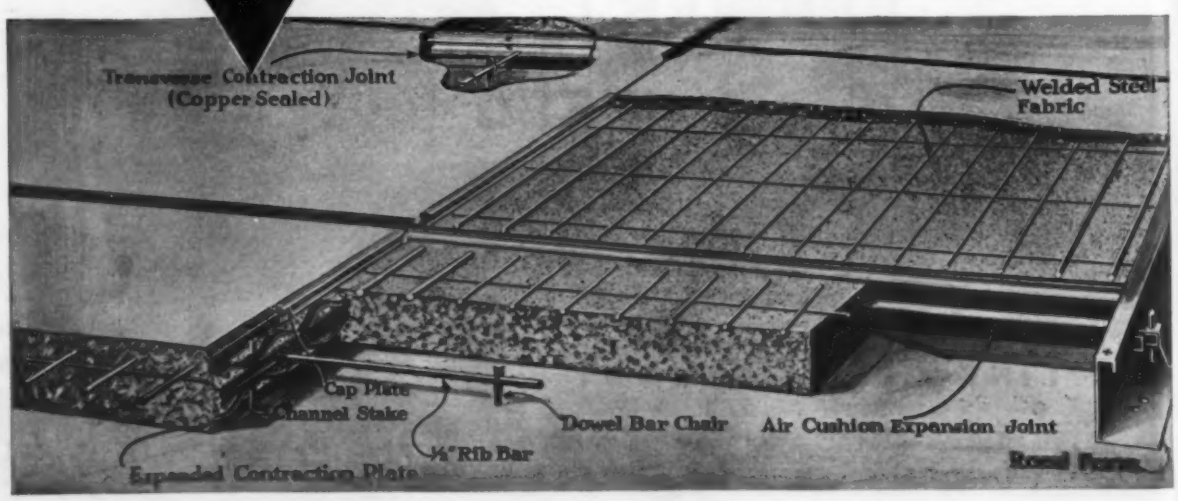
Welded Steel Fabric

Guard Rail

It's a safe assertion that all interests—engineers, contractors, road commissioners and taxpayers—will be better satisfied with Trusconized roads. Truscon has specialized in highway products for over twenty-five years and has developed them to a point of efficiency that sets a new road building standard. Truscon products for road construction include: Welded steel fabric for producing permanent and wear-resisting surfaces—road forms for durability and economy—expansion joints and contraction plates to relieve stresses in concrete bases and provide straight regular cracks when the concrete expands or contracts—rolled steel bars for supplemental reinforcing at roadsides and cross streets—curb bars and edge protectors—guard rails for highway protection and safety—Berm-a-lites to warn of dangerous sections of highway. Write for full information on all of these Truscon highway products.

TRUSCON SETS THE STANDARD

TRUSCON STEEL COMPANY
YOUNGSTOWN, OHIO



Grand Coulee Job Ahead of Schedule

(Continued from page 5)

Excavation on Tremendous Scale

Work is now going on rapidly on the excavation within the west side cofferdam. This undertaking is particularly interesting from two standpoints. One is the removal of the material by a belt conveyor system over a mile long up the side of a hill and dumping it in a ravine. This is the largest belt conveyor ever attempted. The other is the great assemblage of heavy equipment which the contractor now has in operation on the site, for this equipment must excavate and pass onto the belt 4,000 tons per hour.

There are eight excavators on the job, aside from those used by some of the subcontractors, including two Bucyrus-Erie 120-B machines with 5-yard dippers, two Marion 4121's with 4-yard dippers, two Marion 4101's with 3-yard dippers, all electrically operated. Besides these are two diesel-operated units, one Bucyrus-Erie with a 2-yard dipper and a Marion, also with a 2-yard dipper.

These shovels feed a hauling fleet consisting of two 10-yard Linn crawler trucks, two Indiana 4-yard trucks, four White 10-yard trucks, six Mack 11-yard trucks, twenty Athey 7-yard wagons, drawn in pairs by ten Caterpillar Seventy-Five diesel tractors, one Isaacson 16-yard wagon, six Wooldridge 16-yard wagons, each hauled by a diesel Caterpillar Seventy-Five, and five Caterpillar bulldozers.

The trucks and wagons, which are side dump, draw up beside the shovels for their loads and then pass on to nearby grizzlies which are mounted on top of hoppers delivering to the belt line feeders below the surface. As a truck dumps its load on the grizzly, it is followed immediately by the bulldozer which works the larger lumps down through the bars of the grizzly with one or more passes. If there are rocks or boulders in the material too large to pass the grizzly (over 10 inches) the bulldozer pushes them away to a pile from which they are used in nearby fills or trucked to waste.

There are four of the belt feeder lines in the excavation, converging to a central hub where another feeder is located as a control and which delivers to the main belt line.

Belt Conveyor System

The feeders for the belt line are capable of pulling out material at the rate of 2,000 yards per hour each. Two would be sufficient to load the line, but four offers a more flexible arrangement. The control feeder at the hub has a capacity of 4,000 yards per hour.

From the hub feeder, the main con-

(Continued on page 28)

Clamps

For multi-purpose clamps that meet the requirements of all jobs, that have a "hundred uses", . . . Pony Fittings—go on ordinary ¾" pipe, make clamps of any length. Instantly adjustable. Powerful. Strong. Patented stop zipps to position, grips at any point. Crank screw for tightening. Take place of helper on many jobs. Always in use.

Check these uses:

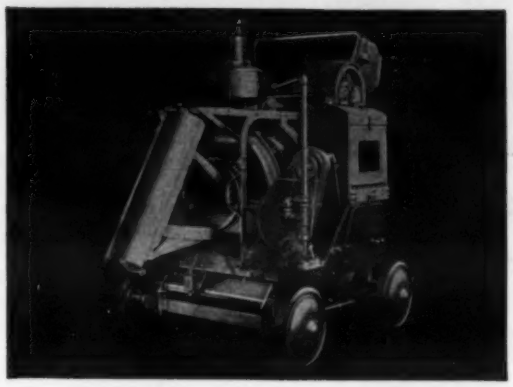
Making sectional forms
Assembling forms in place
Holding forms while pouring pillars, etc.
Holding forms for posts and rails, Pulling in bulges, etc.

Pony

Write for full information.

Adjustable Clamp Co.
"The Clamp Folks"
427 N. Ashland Ave., Chicago, U.S.A.

PRODUCTS OF EXPERIENCE



A COMPLETE LINE . . . .

MODERN DESIGN

LOWER PRICES

★

Write for new bulletin on Wonder Tilting Mixers, Hoists, Pumps, Wheel Barrows, Master & Silverstreak Drum Type Mixers, Saw Rigs, Plaster and Mortar Mixers, Concrete Carts.

CONSTRUCTION MACHINERY CO.

500 Glenwood St.
Waterloo, Ia.

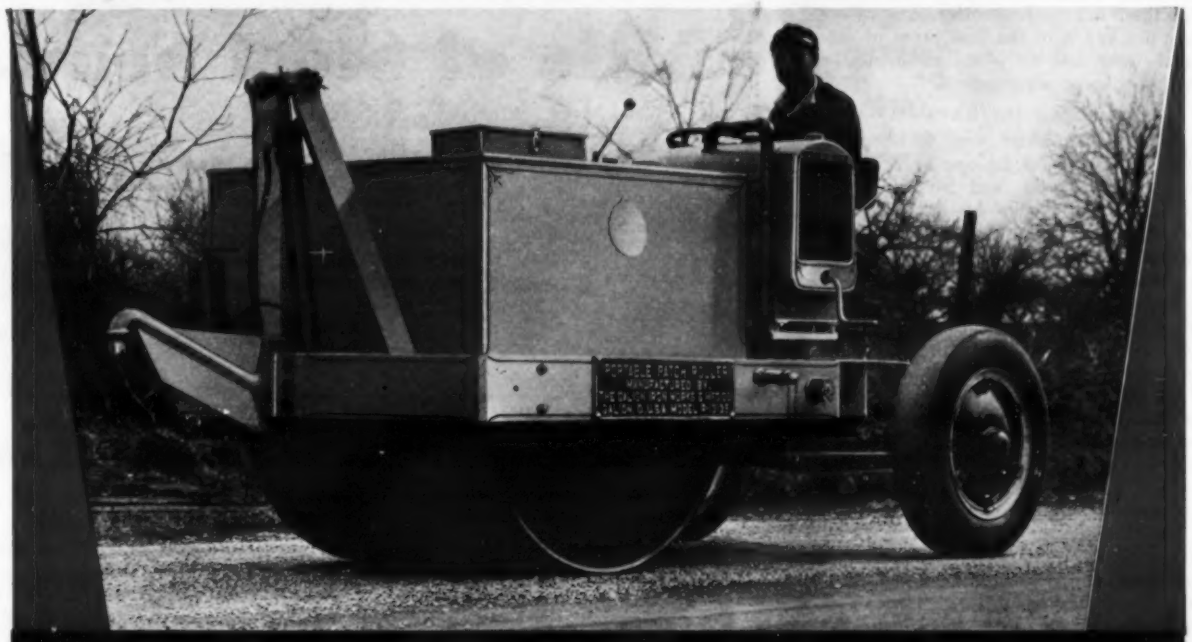
Stout fella!

This new ½ Yd. AMERICAN GOPHER SHOVEL

Send for FREE copy of "AMERICAN GOPHER SHOVELS" Illustrated Action pictures "on the job"

AMERICAN HOIST & DERRICK COMPANY

Manufacturers of
CONTRACTOR'S, INDUSTRIAL AND RAILROAD EQUIPMENT
ST. PAUL, MINNESOTA



GALION PORTABLE PATCH ROLLER

A NEW general utility Roller . . . answers many requirements . . . easily and quickly transported from place to place.

The Galion Patch Roller is a low cost machine of great versatility . . . suitable for use in rolling all kinds of patch material . . . for compacting loose material, rolling drives, etc. An ideal tool for villages, towns, cities, highway departments, large estates, clubs, schools, etc.

Weighing 6300 lbs. (additional weight of 2300 lbs. can be obtained by adding water to the compression roll) this New Patch Roller is equipped with a fully enclosed high efficiency 4-cylinder motor . . . gear case is also fully enclosed and operates on friction reducing bearings in an oil bath.

Portability is one of the outstanding features . . . quickly attached to a truck and roll raised off the ground by means of a hydraulic lift . . . can be transported at truck speed.

Wheel base is 72"—rolling width, 42"—height, 5'6"—width, 5'7"—turning radius, 12'9" to outside—speeds, low 1.5 M.P.H., high 5.0 M.P.H.

Bulletin No. 184 fully describes this New Galion Patch Roller. Send for your copy today.

Above—Roll and steering axle are locked into position . . . ready for towing.
Right—Flexible steering axle makes close to the curb rolling easily accomplished.

The Galion Iron Works & Mfg. Co.,
Galion Ohio
DISTRIBUTORS IN PRINCIPAL CITIES

C. & E. M. Photo

M. J. Thomas, Supt.

Gravel Toughens Sand-Clay Base

(Continued from page 10)

Second Application of Asphalt

A second application of asphalt of 0.25-gallon per square yard was made with the distributor and then No. 6 slag, ½-inch size, was applied with the spreader boxes at the rate of 25 pounds per square yard, hand-broomed to a uniform distribution and then rolled with the 5-ton tandem roller. Any excess fines not keyed to the first layer of material were left in place either to be set by traffic or whipped off.

Completing the Shoulders

A 5-foot shoulder was finished on either side with a 3:1 slope to the ditch. Top soil with the sod included was loaded to the trucks by the Bucyrus-Erie equipped as a ⅞-yard shovel and hauled to the road. When dumping, the trucks spotted half a load at each dumping and the shoulder crew of thirty men, with the assistance of a mule team and fresno to break down the 2-yard piles, spread the shoulder uniformly. A small timber platform was placed on the edge of the road where the trucks were dumping to prevent the load of the heavy truck plus the 4 yards of top soil from breaking up the edge of the newly formed surfacing.

The shoulders and slopes were rolled with a 1,000-pound roller made of concrete cast in a section of steel pipe with an axle centered in the form. This roller was pulled by one of the trucks running on the surface of the road with a pole, extending from the tail gate out to the shoulder.

The ⅞-yard shovel used in loading top soil for the shoulder handled from 1,000 to 1,200 yards 1 foot deep of stripping each day of two 6-hour shifts. The entire organization working the 5-day week with the two 6-hour shifts placed about one mile a week of completed surface treatment and shoulder. One mile a day of priming or placing of stone was the usual speed. The free Saturday was used to make up any lost time during the week. This was plenty because of the wet season during the spring and summer in this district.

Personnel

This contract was completed in the latter part of August, 1934, by the contractor, M. J. Carroll of Ocala, Fla., for whom H. A. Thomas was Superintendent. For the State Highway Department of Georgia, T. H. Jackson was Resident Engineer.

New England Road Machinery Show

An outdoor construction machinery and road materials exhibition will be held at the Brockton, Mass., Fair, September 8-14, under the auspices of the Massachusetts Highway Association. A New England Highway Day will be featured, when the Association will hold its dinner and outing, to which all members of the industry will be invited.

The New England Road Builders Association is also sponsoring the Show, and highway officials, contractors and members of various highway and engineering associations are cordially invited to attend.

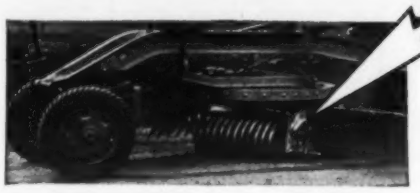
New Porous Drain Pipe with Interlocking Ends

Porous drain pipe, which drains and irrigates, is made by the Smith Porous Drain Pipe Corp., 405 Penn Ave., Pittsburgh, Pa. This pipe is made of hard, coarse, porous materials, specially prepared and bonded together with portland cement. Because it is porous through its entire wall surface, it permits the free and rapid flow of water, in or out of the pipe, for drainage or irrigation.

A feature of this pipe is its interlocking ends, which are claimed to prevent the pipes becoming filled with roots, earth or other foreign matter, as well as making it possible to lay the pipe rapidly and in permanent alignment in the trench.

BAKER DISC GRADER ATTACHMENT

Cuts out corrugations and wavy surfaces on all kinds of low-cost roads and streets. Makes a new machine out of your grader.



FITS ON MOLDBOARD OF ANY ROAD GRADER OR MOTOR PATROL

Nothing to take off your grader. Clamps on in a few minutes.

Write for Bulletin No. 551.

THE BAKER MFG. CO.

585 Stanford Ave., Springfield, Ill.

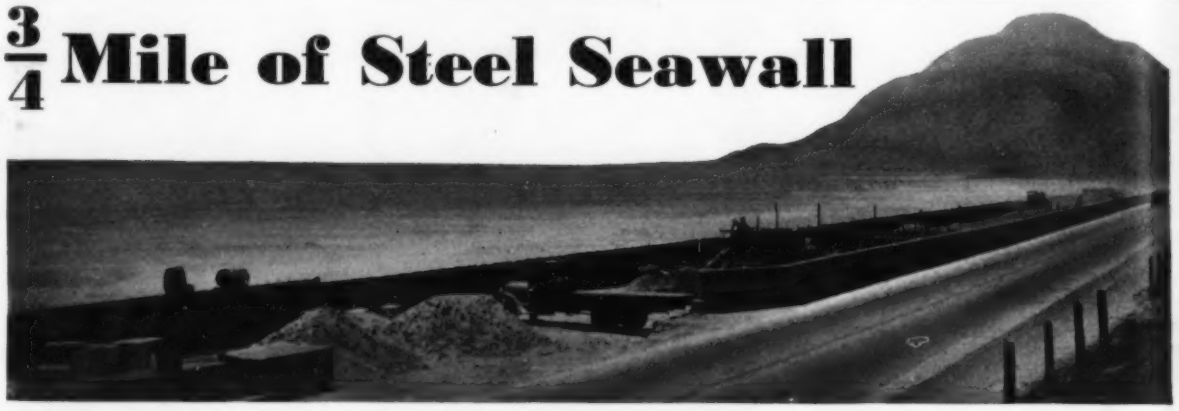
PILE HAMMERS
and
EXTRACTORS
HOISTS – DERRICKS
WHIRLERS

Special Equipment
Movable Bridge Machinery

Write for descriptive catalogs.

McKIERNAN-TERRY CORP.
19 Park Row, New York
Distributors in Principal Cities

¾ Mile of Steel Seawall



protects this Pacific Highway

WIDENING of the Coast Highway between Ventura and Santa Barbara, Calif., has afforded an interesting example of the economy and adaptability of Bethlehem Steel Sheet Piling.

More than 700 tons of Bethlehem Piling were used in three seawalls, nearly ¾ mile in total length, which protect this highway.

The use of steel-sheet piling for this project brought about important savings. The cost of the seawalls, built with Bethlehem Piling, of about $83,000, compares with a cost of $200,000 which engineers estimated for the alternate method of construction that was considered.

Before the piling was driven, each pile was given a protective coating of asphalt. A heavier sand-and-asphalt mastic was then applied over this coating at the scour line, as protection against pebbles hurled against the piling by the waves. State Highway Engineers believe that this coating will last for many years.

Because of the substantial saving in cost of construction and the promise of long life that Bethlehem Piling has afforded in this installation, engineers of the California Department of Public Works, Division of Highways, are making further use of the steel-sheet piling type of shore-protection structure.

There are similar projects in many localities in which Bethlehem Steel Sheet Piling offers an equally simple, economical solution of the problem involved.

C. H. Purcell, *Highway Engineer*, California Department of Public Works; Basich Bros., Torrance, Calif., *General Contractors*

KALMAN STEEL CORPORATION, *Subsidiary of Bethlehem Steel Corporation. General Offices: Bethlehem, Pa. District Offices:* Albany, Atlanta, Baltimore, Boston, Buffalo, Chicago, Cleveland, Cincinnati, Detroit, Houston, Milwaukee, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Syracuse, Washington. Pacific Coast Distributor: PACIFIC COAST STEEL CORPORATION, San Francisco, Los Angeles, Seattle, Portland, Honolulu. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL

BETHLEHEM *Steel Sheet* PILING

Bituminous Surface on Gumbo Base

(Continued from page 1)

the roadbed was first bladed to eliminate irregularities, the blading being as light as possible so as to disturb the set-up gravel on the road as little as possible.

After this, the gravel was primed with No. 2 prime oil at the rate of 0.3 gallon per square yard. The windrowed material was then treated with liquid asphalt in the usual manner by spreading it to a 10-foot width and mixing to a uniform color, using a total of 0.85 gallon per square yard. This mix was spread to a uniform width of 20 feet and allowed to compact under traffic.

The cost record on the 9.2 miles showed a total of $1,514.82 per mile, and tests showed the liquid asphalt to be 7.9 per cent by weight, and the average thickness of the mat was 1¼ inches.

Reshaping Added to Cost

State Highway 19 was laid in two sections of 12.0 and 14.6 miles respectively, with approximately the same operations. The one exception was that it was necessary to open ditches on these sections and to do considerable reshaping which added to the cost. The 12-mile section was completed at a cost of $1,442.98 and a laboratory test of the mat showed 7.1 per cent liquid asphalt by weight and an average thickness of 1½ inches. On the 14.6-mile section, due to the long haul for gravel, the cost was $2,327.56 per mile. The test showed 7.2 per cent of liquid asphalt by weight and an average thickness of 1¾ inches.

Heavy Traffic Carried

The traffic count on State Highway 48 in January, 1935, showed a total of 3,000 vehicles per day, of which 30 per cent were heavy oil field trucks. On State Highway 19 the count showed 1,500 vehicles per day with 10 per cent heavy trucks.

Maintenance

From the experience of the State Highway Department in other sections, it is believed that these mats can be maintained at a cost of $300 to $500 per mile which is less than the amount that would be required to make replacements of gravel to maintain these sections in good condition as gravel roads.

New York Midtown Tunnel Holed Through August 2

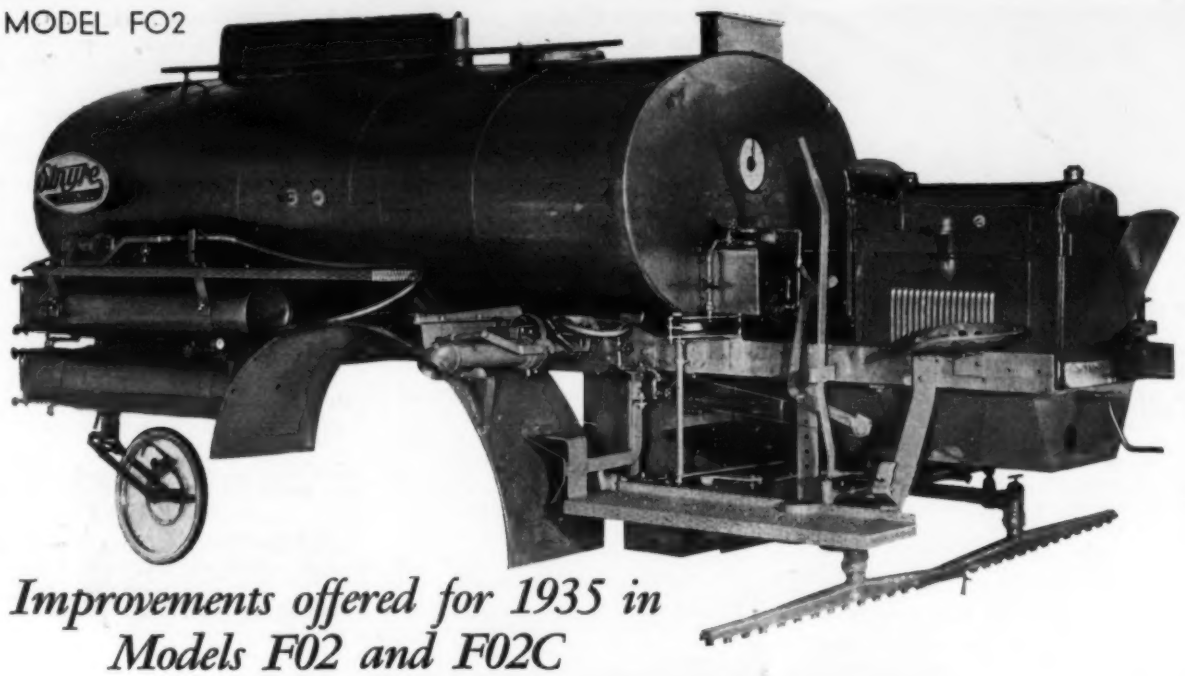
Breaking construction speed records, the new $37,500,000 Midtown Tunnel for automobile traffic being built under the Hudson River between New York City and New Jersey as a PWA project was holed through August 2. The tunnel has been driven through the river silt at the rate of 35 feet a day from the New Jersey shore. This shield which was started September, 1934, was well past midstream heading toward the second shield while it was tunneling the rock on Manhattan Island. The river shield moved as far in a day as the island shield moved in a week, due to the difference in materials.

Mason & Hangar Co., Inc., of New York City, is the contractor for this 6,000-foot tunnel.

Hinds Joins Caterpillar

O. G. Hinds, formerly road machinery supervisor for the Allis-Chalmers Mfg. Co., has joined Caterpillar Tractor Co., Peoria, Ill. as special road machinery representative. He will contact Caterpillar distributors, dealers and their organizations. In 1925, Mr. Hinds as sales manager for the Ryan Mfg. Corp., of Chicago, introduced the power-controlled blade grader to the industry.

MODEL FO2



Improvements offered for 1935 in Models F02 and F02C

ETNYRE

BITUMINOUS DISTRIBUTORS

NEW— *A more compact assembly of pump, valves and circulating system,* making insulation easier, allowing the valves to be readily heated from the motor exhaust, reducing the weight of the unit about 300 pounds, and permitting the distributor to be mounted 4 inches lower on the truck without reducing the road clearance of the spray bars.

NEW— *Leakless valves,* which eliminate the drip-drip which has up till now been so annoying to operators. These leakless valves are being enthusiastically received.

NEW— *The fifth wheel driven tachometer,* more accurate and satisfactory than one driven from either the front wheel or the transmission. On the way to and from the job, the fifth wheel is raised.

Have you a post-card handy? Just write on it: *504,* with your name and address, and we'll send you promptly a copy of our Bulletin 504, which will give you a better, more complete idea of these two new ETNYRES. The same general design and principle of operation that have made the ETNYRE Model F so popular are retained, and we predict that because of their practicability and simplicity, ETNYRE Distributors will continue to be the standard for years to come.

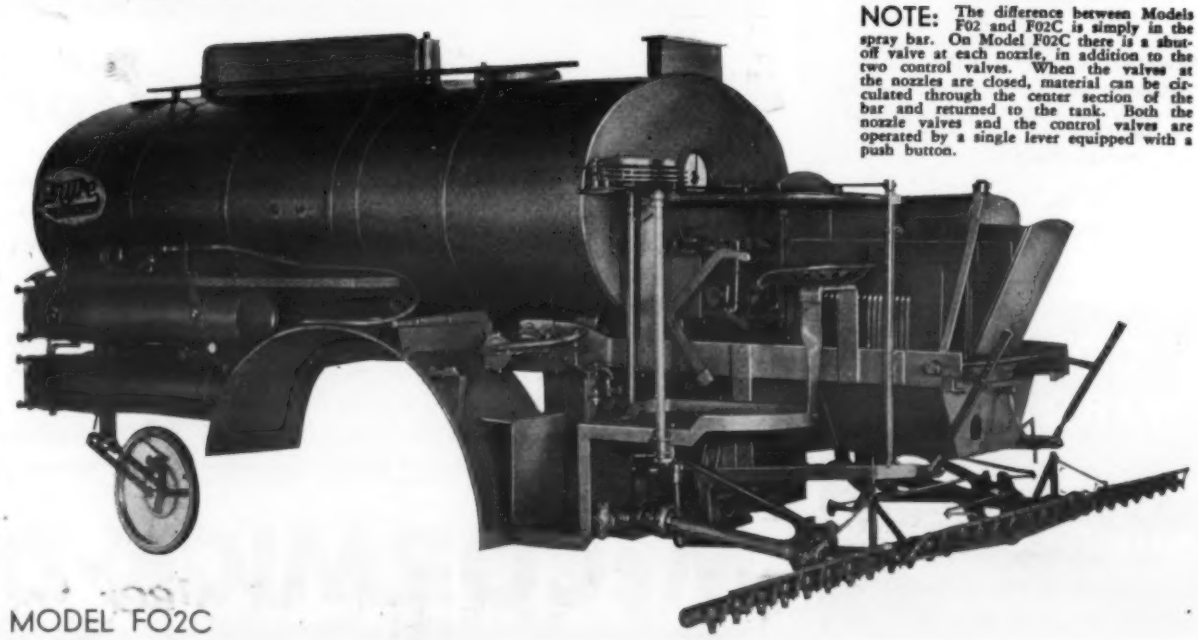
Etnyre

E. D. ETNYRE & COMPANY

DEALERS IN ALL PRINCIPAL CITIES

400 JEFFERSON ST., OREGON, ILL.

NOTE: The difference between Models F02 and F02C is simply in the spray bar. On Model F02C there is a shut-off valve at each nozzle, in addition to the two control valves. When the valves at the nozzles are closed, material can be circulated through the center section of the bar and returned to the tank. Both the nozzle valves and the control valves are operated by a single lever equipped with a push button.



MODEL FO2C

The Main Sheave Bearings and Housings for the Vertical Lift Railway Bridge Over Cape Cod Canal

New Railway Lift Bridge Roller Bearing Equipped

The new railway bridge over the Cape Cod Canal, with a movable span 544 feet long, is the longest of its type in the world and the first one in this country to be equipped with roller bearings. Sixteen roller bearing pillow blocks, made by the Bantam Ball Bearing Co. of South Bend, Ind., support the eight main rope sheaves, each of which is 15 feet in diameter and 31 inches wide. These roller bearing pillows are 52½ inches high, 16 inches wide with a base 5 feet long and weigh approximately 4½ tons each.

The movable span weighs 4,160,000 pounds and the total radial load on each roller bearing will average just under 600,000 pounds. The vertical travel of the span is 130 feet and the time allowed for opening or closing the span is two minutes. The roller bearings will be required to handle their load at 1⅜ revolutions per minute.

The roller bearings themselves are of the self-aligning, straight roller type, incorporating the one-piece Bantam bronze lubricage. Bantam thrust bearings of the self-aligning type are built into the bearing end caps to take any thrust loads which may be encountered.

The 2,000-ton weight of the 544-foot movable span is counterbalanced at each end by a 1,000-ton counterweight of concrete encased in steel. The span is raised by means of forty 2⅜-inch steel cables at each end. These pass over four 15-foot x 10 groove sheaves at the top of the towers and thence down inside the towers to the counterweights. Two power plants will be used to lift the movable span, one in each tower. These will be synchronized electrically to keep the span level in all positions. Two gasoline-engine-driven motor generator sets will be used for auxiliary power in case of breakdown of the main power lines. Due to the fact that traffic in the Canal will greatly exceed railroad traffic, the movable span will normally be kept in the raised position.

The Blakeslee-Rollins Corp., of Boston, and C. W. Blakeslee & Sons, Inc., of New Haven, Conn., were jointly awarded the contract for the substructure of the bridge and the Phoenix Bridge Co., of Phoenixville, Pa., received the contract for the superstructure, including all operating equipment. Col. John J. Kingman, District Engineer for Corps of Engineers, U. S. A., is in general charge of the entire Cape Cod Canal project which includes, in addition to the railroad bridge, two high-level highway bridges and the widening of the canal cut. Capt. R. C. Hunter, Corps of Engineers, was in direct charge of the construction of the railroad bridge substructure.

New Heavy-Duty Semi-Trailer

A 20-ton semi-trailer designed for transporting heavy equipment, such as compressors, tractor and tractor equipment, or general construction machinery, and which is built to handle like a two-wheel trailer, has been announced by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif.

This trailer is mounted on sixteen 8¼ x 20 pneumatic tires. Double oscillating walking beams keep the bed level and force each tire to carry its portion of the load, regardless of road inequalities. Big tires and heavy-duty Timken bearings make for light draft. On good roads and moderate grades, a 1½-ton truck can easily handle this trailer loaded with a 75-hp tractor weighing approximately 33,000 pounds. It has a short turning radius and can get in and out of narrow quarters very easily. A long hook up enables the truck driver to back rapidly, yet have the trailer under perfect control.

The weight of this LeTourneau semi-trailer is 7,920 pounds. The bed is 100 x 144 inches and the length overall is 212 inches.

New F-25
Handles 4 cu. ft. wet concrete

LANSING Contractors' Barrow
. . . with Pneumatic Rubber Tire
and Roller Bearing

LANSING COMPANY
LANSING, MICHIGAN

Chicago New York Minneapolis Boston
Philadelphia San Francisco Kansas City

CUT MOWING COSTS . . . with a

DETROIT MOTOR SCYTHE

- Here is the most economical and easily handled cutter on the market
- It goes anywhere, cuts anything, and enables one man to do the work of four or more with hand scythes.
- It has a 36-inch sickle driven by a powerful one-cylinder gasoline motor and is mounted on a free running 30-inch wheel, allowing it to be backed up, pivoted sharply, or tilted up or down slopes similar to a wheelbarrow.
- It is now produced by a recognized leader among mower manufacturers and during over four years of service, thousands of users have enthusiastically testified to its dependability.

Write for prices and Bulletin No. 3

DETROIT HARVESTER CO.
5450 W. JEFFERSON AVE. DETROIT, MICH.

Low-Cost Power for Every Job

● For the practical solution of your power problems, come to McCormick-Deering. This line of wheel and crawler tractors and stationary power units has thousands of owners and millions of hours of work to recommend it for your use. Whether it be the building or maintaining of roads, or general construction work, you can depend on McCormick-Deering to cut your power costs to the bone. Lay your power requirements before the nearest International Harvester branch or McCormick-Deering distributor—let them specify the right size of tractor or power unit for the job. Also have them tell you about the remarkable economy of the McCormick-Deering Diesel engine which is available in the TD-40 TracTracTor and as a power unit.

●

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WRITE FOR CATALOG
MALL TOOL COMPANY
7747 SOUTH CHICAGO AVENUE
CHICAGO, ILLINOIS

The New Buckeye Spreader

Accurate Stone Spreader Uses Spiral Feed Roll

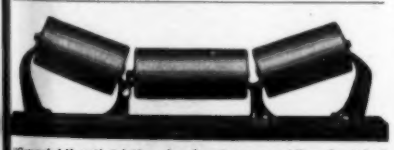
A spreader which showed an accuracy of 99 per cent when tested with ½-inch stone spread at the rate of 10 pounds per square yard in a strip 9 feet wide and 1 mile long has been announced by the Buckeye Traction Ditcher Co., Findlay, Ohio. The spreader rides on two wide-faced wheels on which the load is evenly balanced. The machine is coupled to any truck by a simple device and may be unhooked from one empty truck and attached to a loaded truck quickly.

The machine distributes definitely measured volumes of material through the use of a spirally grooved feed roll driven through a reversible transmission from the wheel shaft. Since either the forward or backward movement of the spreader controls the speed of the feed roll, the accuracy is not affected.

The volume of material spread is controlled by an adjustable shutter bar and the machine will spread wedge courses from 0 to 1½ inches thick in the width of the machine. It can be used for applying chips or sand on bituminous binder material and for such general service as spreading sand on icy roadways, calcium chloride for traffic-bound roads and filler material on macadam.

New General Sales Manager of White Motor Company

J. N. Bauman, Assistant Sales Manager of the White Motor Co., Cleveland, Ohio, has recently been promoted to the position of General Sales Manager. In this new position, Mr. Bauman will direct the sales activities of White through a world-wide sales organization of 80 direct factory branches and several hundred dealers. He succeeds George F. Russell, resigned.



"Conweigh" anti-friction closed end conveyor idlers furnished with ball or roller bearings and malleable iron brackets—mounted on plank or channel base. Arranged for pressure lubrication.

"CONWEIGH" CONVEYING EQUIPMENT

"Conweigh" originated the first anti-friction troughers and today "Conweigh" presents an advanced design which provides the ultimate in economy, performance and service. The new "Conweigh" catalog describes our line of troughing and return idlers, trippers and accessories. They will measure up to the most rigid requirements of the largest as well as the smallest job. We will gladly prepare layouts, sketches, blue prints and quotations upon request.

Our line of portable and semi-portable conveying equipment is described in our catalog of "Porta Conveyors."

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Dredges Build Fill With Scow-Fed Sand

A unique construction operation is under way on the foundation fill for the parkway from 94th Street in the Borough of Queens, New York City, along Flushing Bay to Northern Boulevard. Two large dredges, one located at Northern Boulevard and the other at Jackson's Creek, are placing the fill. Coarse sand from Gravesend Bay, 20 miles away, is being brought in by scow and dumped in front of the Flushing Bay dredges, creating a good mixture of the coarse Gravesend Bay sand with the fine, free-flowing Flushing material. Thus, the pipe line dredges, by means of their pumps, lift up the mixed material from the bay and pump it a mile away to the parkway fill. Rapid progress is being made by this method.

Two 15-yard dipper dredges are at work at Gravesend Bay excavating the sand for shipment by scow to Flushing.

Oil Bath Type

Truck users include
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and on all types of industrial and construction equipment

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SPECIFY AIR-MAZE when ordering new equipment and get those important "plus" features that are only to be had with the genuine Air-Maze.

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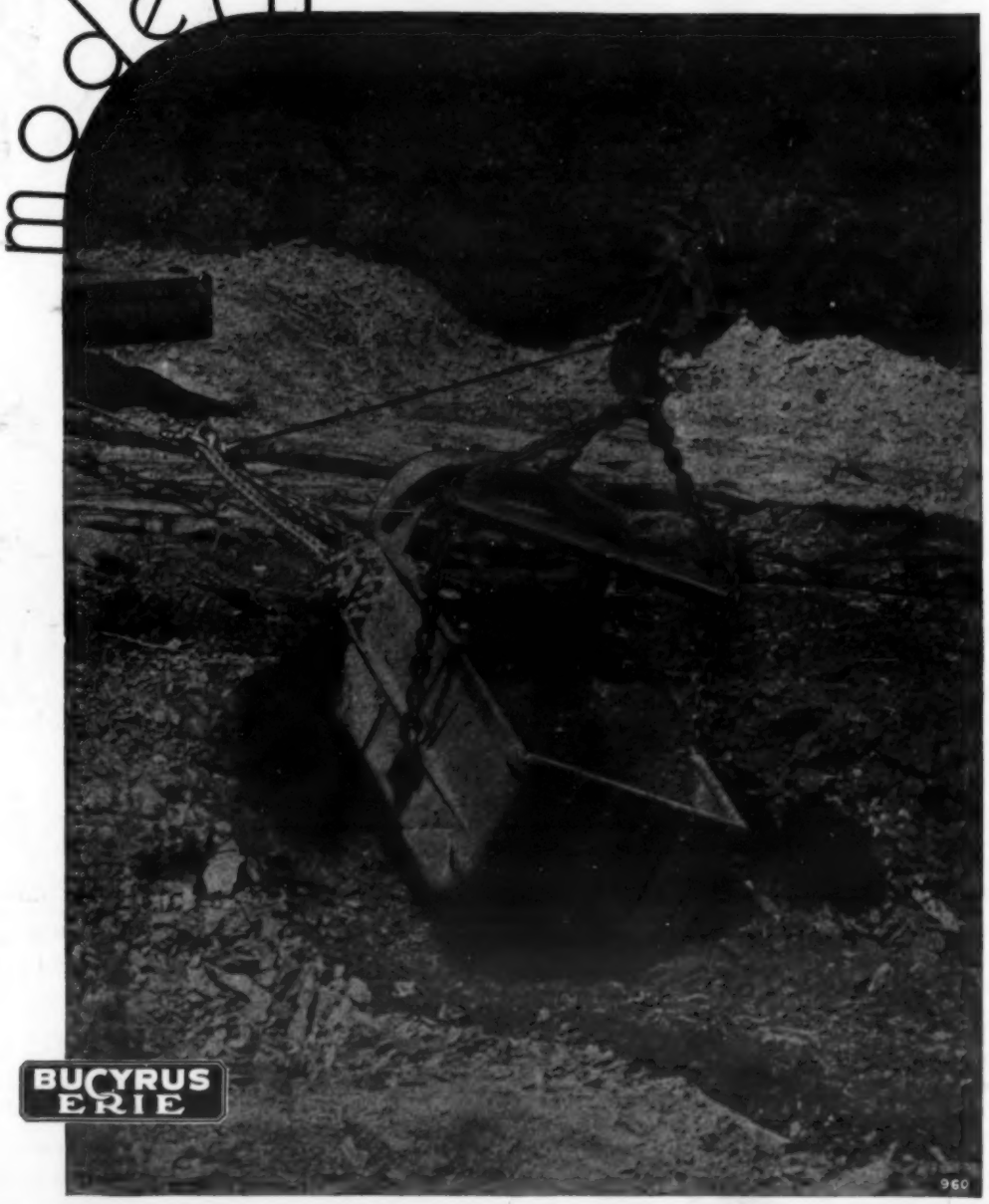
RED-ARCH buckets give "streamlined" performance. All excess weight has been eliminated, every pound of steel carefully placed to give maximum strength and balance. Fittings are of special steels, specially designed to give long service, can be replaced easily, inexpensively. These modern dragline buckets fill quickly . . . carry a heaping load swiftly, surely . . . dump cleanly. Try their "streamlined" speed, their modern endurance, on your jobs.



BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

Grand Coulee Job Ahead of Schedule

(Continued from page 23)

veyor line extends up the hillside. The tandem units comprising it vary in length from 150 feet to 600 feet, depending on the lift. The belt is 60 inches wide and the conveyor train is over a mile long, all the principal belt manufacturers being represented in its construction. The idlers run on Timken bearings.

Each conveyor section is powered by a 200-hp motor. It is all interlocked and controllable from some 50 push button stations. It is also automatically controlled. For example, with the whole line at rest, pushing the button at the top starts the first section and then all the others automatically start, in sequence, back to the excavation.

At the upper end is a stacker with a boom swing of 180 degrees and a radius of 175 feet. The boom is supported near the outer end on a self-propelled crawler which turns it in the circle as desired. The boom can be extended by a telescopic arrangement along the dump for a distance of 50 feet. After that a 50-foot section is added to the main line belt behind it.

An upward slope of about 10 per cent can be negotiated by the stacker. At the pivot of the stacker, the load is carried on rails. The design is very flexible to cover track irregularities and dump settling. It is possible to absorb settling up to 7 feet. The crawler support under the boom has a flexible joint permitting the crawlers to rock longitudinally or laterally or travel off a true circle without binding.

All the conveying units, including feeders and stackers, were designed and furnished by the Jeffrey Manufacturing Co., with Stanley M. Mercier and staff on the site developing the design. The units were installed by the M-W-A-K Co.*

Other Equipment

A mere enumeration of some of the other heavy equipment used on the M-W-A-K contract gives some conception of the size of the undertaking. In lifting equipment alone there are the following: one Bucyrus-Erie 50-B diesel crane; one Marion 371 crawler crane; one Marion crawler electric crane; two Thew-Lorain gas cranes; two American whirlers; four Clyde gantry whirler cranes; three American stiffleg derricks with 110-foot booms; three American steam skid derricks; two gang hammers with electric hoists; one gantry hammer frame for the middle section of the cofferdam.

When the steel sheet piling was being driven, there were twenty-six McKiernan-Terry steam hammers on the job at one time. When the piles were driven and the tops to be cut off in line, no less than ninety men were at work at the same time with Victor gas torches.

*Editor's Note: Since our correspondent visited this job, the contractor has ordered from the Jeffrey Manufacturing Co. additional conveying equipment with driving machinery which will virtually double the length of the belt conveyor system described in this article. This company will also furnish equipment for the aggregate plant, including batteries of electric vibrating feeders.

Personnel

The Grand Coulee Project is being built by the U. S. Bureau of Reclamation, Department of the Interior. It is being designed by the Denver office. F. A. Banks is Construction Engineer in charge, J. H. Miner is Office Engineer and A. F. Darland is Field Engineer.

For the Mason-Walsh-Atkinson-Kier Co., H. L. Myer is General Manager, H. M. Slocum, Superintendent, and C. D. Riddle, Job Engineer.

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2" Self-Priming Centrifugal Pump

Easily carried by one man; 100% automatic
No handles or petcocks to be adjusted—weighs 98 pounds
Four-cycle engine with oil reservoir in crankcase
Easy to start—Speed control—Air cleaner
Foot and rope starters—self-oiling. Engine has only one place requiring lubrication.

Ask for Specification Sheet 20A

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GEORGE HAISS MFG. CO., Inc. **HAISS** Canal Pl. & E. 142 Street New York

Send me full details and prices on equipment checked

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- ☐ 1—Haiss 1 yd. HiPower Digging Bucket
- ☐ 1—Haiss 1 yd. Contractor Type Bucket
- ☐ 1—Hayward 1½ yd. Type "E" Bucket
- ☐ 1—Haiss ¼ yd. HiPower Digging Bucket
- ☐ 1—Hayward 1¼ yd. Type "E" Bucket

Factory Rebuilt Truck Loaders and Belt Conveyor

- ☐ 1—Haiss 2 yd. a min. Creeper Truck Loader
- ☐ 1—Haiss 1¼ yd. a min. Creeper Truck Loader
- ☐ 1—Haiss 25 ft. 16 in. Trough Conveyor, Lelief, Gas.

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Address _____

FOR SALE

6 50-B Bucyrus Erie Diesel Draglines, 50 ft. boom, 10 ft. extension, caterpillar mounted, choice of 1½ or 2 yard bucket.

5 Model 775 P & H Diesel Draglines, choice of 1 or 1¼ yard bucket.

4 Model 35 "Caterpillar" Gasoline Tractors with La Plant Choate Hydraulic Bulldozers.

The above are part of the surplus construction equipment of the Middle Rio Grande Conservancy District. Wire or write for complete list and prices of available equipment.

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COPY of this 80-page book is ready. You will find its profusely illustrated, data-filled pages of absorbing interest. It contains a wealth of information on the design of pile foundations and pile driving practices which, while known to a few, has never before been published for general distribution. Much of the material is entirely new, based on recent tests. All of it is of vital importance to those interested in bearing piles. Send for your copy today.

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Well-Planned Details on Moran Job

(Continued from page 15)

and cement sticking to damp spots in the skip. The subgrade planer pulled by the paver carried extra rolls of paving paper, dowels and two half sections of steel drums which were catch-alls for tools of all kinds. In addition to the man who dumped the trucks and the paver operator, there were four puddlers, two who worked inside the forms and two outside. There were two men shoveling from the trail grader to remove excess earth. Seven rolls of the paving paper were kept unrolled at each move of the paver. The inside puddlers threw concrete over them to hold the paper in place as the steel men unrolled them.

The two steel men set the eight "hair pins" at the corners at each expansion joint and also set the transverse bars on 3-foot centers running alternately from the sides. These 12-foot x 5/8-inch bars were placed after the paving paper was in place and were held 3½ inches from the bottom of the slab by metal chairs.

Machine and Hand Finishing

An Ord finishing machine followed immediately after the concrete had been spread by the paver bucket and the puddlers. The finisher carried a large tool box and pulled a trailer with the dummy joint material. The two longitudinal float men manipulated the 12-foot x 12-inch float from a twin rolling bridge which they blocked each time they made a move ahead. These two men handled the dummy joint cutter which was carried at the front of the twin bridge and consisted of an I-beam cut in half so that the top flange limited the depth of the cut. They used a standard center strip "gun" which placed the material in the slot straight as a die as soon as the outer section had been pounded into the new concrete.

The man who made up the expansion joints ahead also aided in pulling hose and loaded the center joint gun.

Two finishers, one of whom has been in the game for 22 years, used a 10-foot drag straight-edge and then checked, following up with a long handle float, where necessary, to build up a low spot in the slab. This was followed by two 8-inch canvas belts used by the same men. One finisher cut the joints and edged the pavement where that was necessary.

Lip curb was built on all grades and the inside of super-elevated curves. As this job had little level slab the edging of the slab was a minor matter. Two men on a side handled the lip curb. It was built up against the top curb forms 3 inches high, 3 inches wide at the top and feathering out to the slab 12 inches from the form. One man did all the building of the lip curb and finished it, with a helper putting up the form and piling the concrete from the half drums of concrete set outside the forms by the outside puddlers every 20 feet and covered with wet burlap.

The burlap for initial curing was carried on a 4-wheel bridge with extra large flanged wheels and with the bed of the bridge covered with sheet metal to prevent rotting of the wood from constant wetting and to keep the water from dripping on the fresh concrete. Two men handled the wetting and placing of the burlap and one man followed up, keeping the burlap soaked. Ordinarily a Nebraska concrete pavement is cured by ponding but the continuous changes of grade on this job made it necessary to leave the burlap on the slab for 72 hours, keeping it wet all the time.

The forms were stripped by four men and loaded onto a 2-horse flat-bed wagon and hauled ahead along the shoulder.

The Water Supply

Water was secured in sufficient quantity by damming a small creek near the east end of the work, using earth and canvas to form the dam. A pair of Jaeger triplex pumps, with the suctions in a screen of fine mesh to keep out grass, delivered the water to the line for the paver and for sprinkling. As mentioned before, the pump foreman lived close by the pumps.

Some Other Details

Several 2-wheel tool wagons were spotted along the job and each was painted aluminum to protect it from the weather and make it conspicuous and hence easily found.

The single bridge used by the joint finisher was well padded with old burlap so that the job of kneeling all day would not be too arduous.

All tools with wooden handles, such as shovels, mattocks, etc., were branded "Moran" to insure ready return if they wandered into the hands of folks not actually working on the job.

Arrangements were made with the Don Mundy Oil Co. of Fremont, Nebr., to fuel and oil all equipment twice each day. A light truck with gasoline and oil went over the entire job in the early morning as the work started up and again around noon and furnished the fuel and oil needed, with each man signing for the amount taken.

And believe it or not, there was a woman on the job. She worked in the office and knew just how many batches had been hauled out to the paver, how many gallons of gas had been used by each truck and, with the help of a handy adding machine, had the details of the job right under her thumb.

Labor and Hours

The average number of men engaged on this contract was 50 on grading and 175 on paving. They worked a single shift each day, making their 10 hours a day in three consecutive days, working three days and laying off three days.

Personnel

The contract for this project was originally awarded to E. A. Wickham and Frank J. Moran of Omaha, Nebr., but Mr. Moran bought out the interest of Mr. Wickham and operated the contract himself as the Moran Construction Co., with George Myers as Superintendent on grading, and Fred Caltrider as Superintendent on concrete. E. M. Kennedy was Office Manager assisted by Miss Alice Egan as Secretary. John McMeekin was Project Engineer for the Nebraska Department of Roads and Irrigation.

Road Machinery Company Re-Opens in Portland

The Western Road Machinery Co., with Edward L. Kropp, Manager, reopened in Portland, Ore., in June, with office and warehouse located at 83 S. E. Belmont Street. This company, which was previously in business for many years, will carry a line of road building and earth handling machinery.

JAEGER *Adjustable* SPREADER

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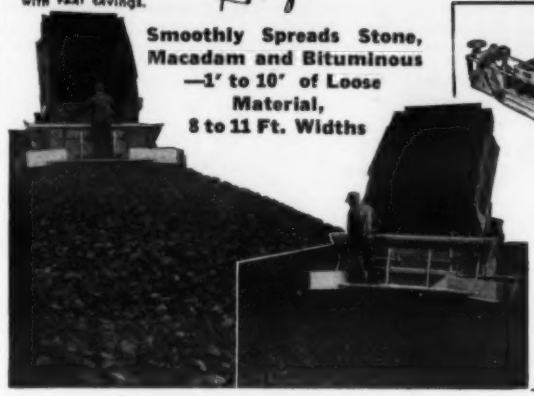
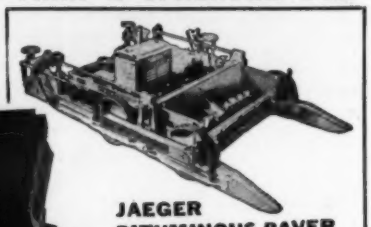
COSTS NO MORE THAN A SPREADER BOX



Smoothly Spreads Stone, Macadam and Bituminous —1" to 10" of Loose Material, 8 to 11 Ft. Widths



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power-driven, adjustable 9 to 15 ft., does precision job without forms. Write for details.

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CUMMINS Diesel-powered tank truck used for oiling roads in California. One of a number of CUMMINS-powered tank trucks owned by Oilfields Trucking Co., Bakersfield, Cal.

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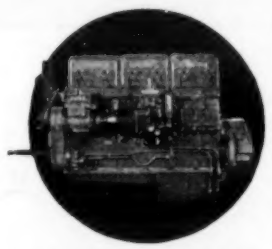

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New Lubrication Equipment Catalog

429 Alemite Corp., 1850 Diversey Parkway, Chicago, Ill., has announced the revised mid-year 1935 Alemite Powergun Equipment Catalog, in which are presented, in natural colors, all equipment and accessories for every kind of complete, economical lubrication job, as well as full details, specifications and prices. Copies of this 25-page catalog are available to our readers upon request.

New Catalog on Wire Rope

430 The new Williamsport catalog containing all the newest ideas in wire rope construction and much valuable data will be available to interested contractors who write for it immediately. Address the Williamsport Wire Rope Co., 122 So. Michigan Ave., Chicago, Ill.

Complete Line of Asphalts and Road Oils

431 Specifications and all other details on the Standard line of asphalt for street and road construction and maintenance, as well as asphaltic road oils, asphalt joint fillers and asphalt for waterproofing, may be secured by interested contractors and highway officials from the Standard Oil of New York Division of Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.

A Disc Grader Attachment

432 The Baker disc grader attachment for cutting out corrugations and wavy surfaces on all kinds of low-cost roads, which fits on the moldboard of any grader or motor patrol, is described in Bulletin No. 551 which the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill., will be glad to send on request.

Crushing and Screening Equipment

433 If you send your needs for crushing and screening equipment to the Universal Crusher Co., 620 C Avenue West, Cedar Rapids, Iowa, the company will be glad to send its literature on Universal crushing, screening and loading equipment, with suggestions as to how this may be adapted best to varying requirements.

A New Model 1½-Ton 6-Cylinder Truck

434 Complete information on the new International 1½-ton 6-cylinder Model C-30 truck, combining economy and performance, may be secured by those interested from the International Harvester Co. of America, 606 So. Michigan Ave., Chicago, Ill.

Pile Hammers and Extractors

435 McKiernan-Terry pile hammers and pullers, in a variety of sizes to meet the requirements of the construction industry, are described in literature which McKiernan-Terry Corp., 19 Park Row, New York City will be glad to send to those interested.

New Manual on Curing Concrete

436 A manual prepared from a report of the Highway Research Board, the U. S. Bureau of Public Roads, various state highway departments and other reliable sources and containing details on surface curing and admixture curing with descriptions of apparatus for both methods, specifications and general information on Dowflake curing has been issued by The Dow Chemical Co., Midland, Mich., for free distribution to contractors and engineers.

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Steel for Highways

437 Truscon Steel Co., Youngstown, Ohio, will be glad to send to contractors and highway officials complete information on Truscon steel products for the construction of highways, including road forms, reinforcing, contraction joints, and guard rail.

A 2-Inch Self-Priming Centrifugal

438 Specification Sheet 20A containing full information on the Marlow 2-inch self-priming portable centrifugal pump, which is 100 per cent automatic and is easily carried by one man, may be secured by those interested from Marlow Pumps, Ridgewood, N. J.

Complete Line of Portable Conveyors

439 The complete line of Porta portable conveyors for handling loose materials, in a variety of sizes and styles, is described and illustrated in literature which the Portable Machinery Co., Box C-1, York, Pa., will be glad to send on request.

A Wellpoint System for Tough Jobs

440 The Griffin wellpoint system, consisting of Griffin Jet 'N Drive wellpoints, features of which are the one-piece screen, two-tube construction, 100 per cent efficient drainage area and channels, and the exclusive Interflow between channels, and the Worthington wellpoint pump especially designed for the Griffin wellpoint system, is described in literature which the Griffin Wellpoint Corp., 60 East 42nd St., New York City, will be glad to send on request.

Complete Line of Excavators

441 Link-Belt Co., 300 W. Pershing Road, Chicago, Ill., will be glad to send to interested contractors complete information on Link-Belt shovels-cranes-draglines, in ¾ to 3-yard capacities, with gas engine, diesel or electric motor drive, all of which can be shipped loaded on a flat car without dismantling.

Trucks for Heavy-Duty Service

442 Complete information on White and Indiana trucks, which offer a complete range of styles, capacities and prices to meet the varying requirements of the construction industry, is available upon request to contractors and state highway department officials from the White Motor Co., Cleveland, Ohio.

New Highway Guard Rail

443 Kalguard, a new, modern and economical highway guard rail which meets all state specifications, the features of which are simplicity of design, durability, low maintenance expense, effectiveness, and ease of installation, is described in literature which the Kalman Steel Corp., Bethlehem, Pa., will be glad to send on request.

Hauling 10 to 14 Cubic Yards per Trip

444 To cut down hauling costs, whether you are handling large rock, small rock, shale or earth, the LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa, offers help in its Circular 515-A describing in detail LaPlant-Choate two-way crawler dump wagons.

Gasoline and Diesel-Powered Tractors

445 Cleveland Tractor Co., Cleveland, Ohio, will be glad to send to those interested complete information on Cletrac gasoline and diesel-powered tractors from 22 to 80 hp, designed for economical, steady service.

Heavy-Duty Hammer Crushers

446 Bonnot hammer crushers in 20, 30, and 50-inch series are described and illustrated in Bulletin 75 which the Bonnot Co., Canton, Ohio, will be glad to send free on request.

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Problems of Road-Mix in Humid Areas

(Continued from page 2)

1930 in cooperation with the U. S. Bureau of Public Roads. The 21 sections covered a length of 10 miles on U. S. 30, beginning at the California-Nevada state line and extending southwest.

The experiments were grouped with respect to the type of construction and materials used as follows:

1. Road-mixes of crushed stone and gravel aggregates with different types and various grades of bituminous materials.
2. Surface treatment of road-mixes.
3. Surface treatments on a traffic-bound stone base course.

Conclusions

T. E. Stanton, Materials and Research Engineer, Division of Highways, California, and J. T. Pauls, Senior Highway Engineer, U. S. Bureau of Public Roads, have recently presented a report on these experiments resulting in the following nine conclusions.

1. Portions of the oil-mix sections were affected by capillary moisture which resulted in the surface becoming soft and unstable.
2. The effect of moisture on the road-mix sections with slow-curing oils was greatest with the rich mixes and on areas where the drainage was not satisfactory, as well as on subgrades having high capillarity.
3. The road-mix surfaces containing emulsion and cut-back asphalt did not lose stability or develop soft areas from the action of the moisture as did several of the oil-mix sections.
4. The action of moisture seemed to be more severe on the oil and gravel mixes than on the oil and crushed stone mixes.
5. The excellent behavior of a lean oil mix with a light surface treatment of heavy asphaltic oil and stone chips suggests possible advantages of this type over the richer and unsealed oil mixes, particularly where moisture conditions are unfavorable.
6. Satisfactory repair of those portions of the oil-mix surfaces which softened was obtained by scarifying and remixing.
7. Slow-curing or medium-curing bituminous materials should be used for road-mix construction with aggregates of the dense-graded type, while the more rapid-curing materials are best adapted to aggregates of the more open type (those containing less than 5 per cent of material passing the No. 200 sieve).
8. The results of these experiments indicate that several of the formulas now in use are satisfactory for determining the amount of bituminous material required as binder in road-mix construction with the lighter slow-curing oils and close-graded aggregates.
9. For the very heavy slow-curing oils and the cut backs and emulsions which develop heavy asphaltic residues in the road surface, somewhat greater quantities than those indicated by the usual formula may be used to advantage in most cases.

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CUTTING AND WELDING APPARATUS
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Cleaning Equipment in Less Time

Some interesting comparative figures for cleaning equipment have been secured by W. T. Walsh of the W. T. Walsh Equipment Co., of Cleveland, Ohio. For thoroughly cleaning a tractor gas engine, the usual time was 16 hours. This same engine was cleaned, removing a heavy coating of grease and dirt, in 2 hours with a Hypressure Jenny, saving 14 hours on one job alone.

On a 5-ton Mack truck, cleaning and preparing for painting required 95 hours for a previous method, while the spray cleaning method, using a Hypressure Jenny, required only 6 hours. Another truck, which formerly has required 16 hours for cleaning, was cleaned with a Hypressure Jenny in 2 hours. The difference in these methods is due to the effectiveness of the spray cleaning method.

New Mobile Yard Crane Handles 7-Ton Loads

The mobility of the Loadmaster crane mounted on a tractor is well-known to most contractors. Bucyrus-Erie Co., South Milwaukee, Wis., in its Bulletin L-503, has announced a bigger Loadmaster, the Bucyrus-Erie CT-50, which has all the mobility of the smaller machine but can handle loads up to 7 tons. It has a lifting capacity of 13,000 pounds at a 12-foot radius and the boom swings through an arc of 240 degrees.

Features of the crane are the low ground-bearing pressure of the crawlers, the equalized crawler mounting which automatically adjusts itself so that both traction belts follow surface irregularities and maintain maximum contact with the ground, and adequate steering control with the levers conveniently located and easily moved.

Million Yards of Dirt Moved on Landscape Job

A million yards of dirt was moved in the landscaping of Forest Lawn Memorial Park, Glendale, Calif., by the Lewis Construction Co., Los Angeles, Calif. Six Caterpillar diesel Seventy-Fives, eight LeTourneau 12-yard Carryalls, and a LeTourneau rooter were used on the job. The grades were steep, often reaching 30 per cent.

A tandem hook-up of two Carryall scrapers and a tractor working over a round trip haul of 2,800 feet made the trip in 14 minutes with the empty haul being made over a 14 per cent grade. The tractors and scrapers worked 22 hours a day.

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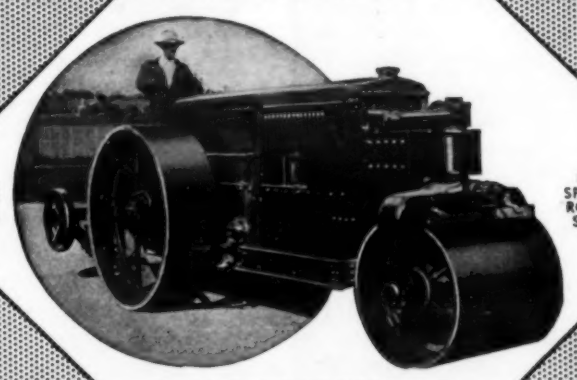

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One of the World's Two Largest All-Welded Truss Bridges Which Spans the Rancocas River, Connecting Riverside and Delanco, N.J. The Structure Consists of Two Approach Fixed Spans and a 160-Foot Swing Span. See Page 17.

The Crawler-Mounted 137-Foot Head Tower Used at Vidalia, La., By H. B. Blanks.

Dumping 15 Yards of Dirt on the Levee at Vidalia.

The Mississippi River, the Tail Tower and the Bucket Bringing in a Load on the H. B. Blanks Job. See Page 2.

C & E M Photos

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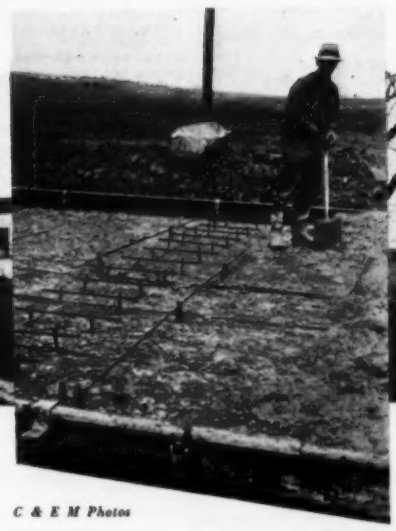
A Two-Story Tabby Structure Still Standing on St. Simons Island, Ga., Showing the Thickness of the Walls. See Page 2.

An Elevating Grader with Engine-Driven Belt Opening Up a New Borrow Pit on Frank J. Moran's Grading and Concrete Contract Between Union and Lincoln, Nebr. See Page 1.



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Left, A Dummy Joint Showing the Dowels and Adjacent Transverse Rods. Above, the 27-E Paver Pouring the 20-Foot Slab on Paving Paper, on the Moran Job.

A Twilight Scene at Grand Coulee, with the Twinkling Lights Outlining the Path of the Mile-Long Belt Conveyor Which Is Moving Dirt from the Cofferdam at the Rate of 4,000 Tons an Hour. Floating Equipment is Seen at the Left and the Access Bridge at the Right. See Page 5.